The Evaluation of Graduate Nurses' Performance Gaps in Blood Administration

By



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Submitted to the graduate degree program in Educational Leadership and Policy Studies and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Date Approved: April 11, 2018

## Abstract

New nurse graduates are expected to help relieve the current and pending massive nursing shortage anticipated in the nursing field (Goode, Reid Ponte, & Sullivan Havens, 2016). However, there is a discrepancy between evaluations of new graduate readiness and the expectation to provide competent complex care. Ninety percent of undergraduate nursing education leaders feel new graduate nurses are prepared to practice, yet 90% of hospital nurse administrators disagree. When graduate nurses participating in nurse residency programs perform self-assessments on procedural readiness, emergency management and blood product administration/transfusion are frequently in the top three skills/procedures they feel uncomfortable performing independently. Yet little is published regarding specifics within the procedure that lead to a gap in readiness to practice.

In this study, an exploratory mixed methods action research approach was taken to evaluate graduate nurses' performance gaps in blood administration procedures. Graduate nurses participating in a nurse residency program (n = 143) completed online surveys questioning their experiences and comfort with blood administration. Questions asked graduate nurses about nursing school blood administration training, stated comfort with performance, and experiences surrounding blood administration. Open-ended questions were used to identify common themes for more educational opportunities and the graduate nurses' previous experience.

Expert nurses were interviewed to gather organizational and department-specific blood administration processes relative to the patient care. Expert nurses (n=8) were asked about organizational orientation and performance practices in blood administration. Qualitative analysis of the interview themes was used to complete a preliminary procedural assessment. We then conducted consensus building to determine the underlying competencies needed for each

procedural step (i.e., basic knowledge, psychomotor skill, and/or critical decision making) and the essentiality of each step for safe blood administration.

Results indicated that graduate nurses had a mean comfort level with blood administration of 3.1 out of a 5-point Likert scale, near the "Undecided" anchor at 3.0. "Comfort" correlated positively with perceived Level of Difficulty in three of five subtasks: Starting a Transfusion, Assessment, and Documentation. "Comfort" correlated positively with self-perceived Learning Achievement for the subtasks "Starting Transfusion" and "Documentation." Survey results revealed no statistically significant relationship with "Comfort" and "Recent Semesters" or "More Semesters" of learning; Learning Difficulty with understanding "Purpose" or "Risks"; or self-perceived Learning Achievement in understanding "Purpose," "Risks," or "Assessment." Of those participants with previous experience prior to licensure (80%, $n = 114$), most were Nursing Assistants in acute care (48%, $n = 55$) and Nursing Assistants in nonacute care (18%, $n = 21$) – patient care areas which require significant amounts of hands-on patient care. However, one-way between-groups ANOVA comparing the effect of previous experience on "Comfort" showed no statistical significance at the $p < .05$ level [$F(2, 111) = 1.109$, $p = .333$]. When comparing graduate nurse survey responses and nurse expert interview themes, only two commonalities were emphasized within blood administration: skills within starting a transfusion and assessment of the patient receiving a blood transfusion.

This study explored and found specific factors and curriculum training characteristics consistent with graduate nurses' level of comfort with blood administration. The study also provided a 6-Phase Blood Administration Task List to be used in future competency-based assessment and education.

**Acknowledgements**

I would never have been able to complete my doctoral degree without the guidance of my committee members, help from my colleagues, and support from my family, specifically my husband and kids.

I would like to express by deepest gratitude to my Chair and Advisor, Dr. Aust, for his acceptance of my application, as well as his guidance and encouragement during my time at KU. I would also like to thank Dr. Lee for his theoretical focus; Dr. Ng for sharing her passion of qualitative study; Dr. Kingston for his never-ending patience during my quantitative study; and Dr. Lineberry, who has taught me so much about assessment, professional moxie, and mentored me in the human patient simulation evaluation environment.

I would also like to thank the University of Kansas Hospital nurse residency program, the University of Kansas Hospital System, and my colleagues at the Zamierowski Institute for Experiential Learning. Your assistance with recruitment; participation; tutorials of SPSS and NVivo during my preparation of data; patience during my complaints and meltdowns; and the sharing of knowledge and resources during the entire research process were invaluable to my success.

Finally, I would like to thank my family. My husband, Todd, has always been my better half and has stood by me through the good and bad times. My kiddos, Maggie and Christian, understood when Mommy was busy with school work, impatient with them, and wasn't always available to play. Without my whole family's support, this aspiration wouldn't have been possible.

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# CHAPTER I: INTRODUCTION

The United States is suffering from a shortage of more than 500,000 nurses, and the shortage will only intensify over the next ten years (American Association of Colleges of Nursing, 2014). Adding to the shortage of nurses in practice are several exacerbating factors: a shortage of faculty to train students, along with the high rates of retirement and turnover of nurses from greater workplace demands, paperwork, overtime, and burnout (American Association of Colleges of Nursing, 2015). Nurses working with inadequate staffing affect patient care and outcomes. The greater the patient load, the greater the likelihood of hospital readmissions, patient infections, and mortality rates (Cho et al., 2016). The American Association of Colleges of Nursing (AACN) is working with the Institute of Medicine (IOM) to identify ways to overcome the nursing shortage.

## Problem Statement

New nursing school graduates are one of the resources expected to fill vacancies within the nursing shortage (Goode, Lynn, McElroy, Bednash, & Murray, 2013). Graduate nurses are novice practitioners, expected to provide competent clinical, critical thinking and decision making skills. Benner's *From Novice to Expert* describes five levels of nursing experience: Novice, Advanced Beginner, Competent, Proficient, and Expert (P. E. Benner, 2001). Advancement through the levels of Benner's theoretical framework requires development of skills and expertise in patient care over time. Graduate nurses require time and experience to meet these expectations; therefore, hospitals are faced with many of their employed nurses having insufficient expertise to guide their practice. New graduate nurses are likely to suffer from decreased confidence, increased stress, turnover, and are 40% more likely to commit medication errors than experienced nurses (Hayden, Smiley, Alexander, Kardong-Edgren, &

Jeffries, 2014). The cost of turnover for a bedside nurse ranges from $37,700 to $58,400, resulting in a $5.2 to $8.1 million loss for the average hospital (NSI Nursing Solutions, Inc., 2016). Graduate nurses' turnover rates are reported to be 17.5% at year one, 33.5% at year two, and as high as 43% within the first three years of employment (Punke, 2016). Therefore, another recommendation to address the shortage of nurses is to reduce turnover rates through improved support of newly licensed nurses.

**Purpose of This Study**

The purpose of this exploratory mixed methods action research study was to provide a better understanding of the circumstances surrounding actual and perceived gaps in prelicensure preparation to practice that graduate nurses have performing blood administration procedures independently. The results of the study make recommendations to continue with the design and validation of a simulation based blood administration assessment; curricula timing changes in prelicensure programs; and nurse residency and hospital orientation training to improve nursing practice and hopefully patient outcomes.

**Research Questions**

1. Among nurse graduates, what factors are associated with variance in perceived readiness for independent practice in blood administration procedures?
2. What curriculum and/or training characteristics within prelicensure nursing programs correlate with variation in perceived lack in readiness to practice blood administration independently?
3. What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site?

4. What aspect(s) of a blood administration do graduate nurses frequently struggle to perform independently as determined by study site experts?

**Rationale for the Study**

Both practical and safety reasons exist for conducting this study. Promoting graduate nurses' success in transition to practice has institutional, personal, and societal advantages. If it is known what specific parts of blood administration can be attributed to graduate nurses' lack of readiness to practice independently, then additional training can be developed in a cost effective manner. Providing cost effective training saves an institution expenses incurred by turnover of nurses and training costs on areas that are not needed. Additionally, recent changes in healthcare reimbursement have reduced the amount of money hospitals receive if patients have poor outcomes related to medical errors. Benefits of specific blood administration training include increased feelings of readiness to practice, job satisfaction, and increased knowledge of safe blood administration practices. Finally, safe patient care provides improved patient outcomes and confidence in the nursing profession.

**Significance of the Study**

**Nurse residency.** Nursing leaders have determined that new nurses are underprepared for the challenges of patient care (Benner, Sutphen, Leonard, & Day, 2010). The IOM's report, *The Future of Nursing: Leading Change, Advancing Health* (2011), recommends the implementation of nurse residency programs to facilitate the transition of newly graduated nurses into practice. Residency programs help new graduate nurses develop the skills, competence, and confidence required for independent practice (Edwards, Hawker, Carrier, & Rees, 2015; Goode et al., 2016; Park & Jones, 2010). Nurse residencies also produce substantial rewards for healthcare

organizations by improving retention, organizational commitment, and the development of future nurse leaders (Goode et al., 2016; Krugman et al., 2006).

Nurse residency programs have been shown to decrease turnover and increase the competency and confidence of new graduates (Valdez, 2008). The use of nurse residency programs improves the expertise gap that occurs when large numbers of expert nurses retire and large numbers of new graduates enter the workforce at the same time (Orsolini-Hain & Malone, 2007).

One of the most feared procedures by nurse residents, according to the Casey-Fink Readiness for Practice surveys, is blood administration/transfusion (Casey, Fink, Krugman, & Propst, 2004). During self-assessment of readiness to practice independently, graduate nurses participating in nurse residency programs routinely rank blood product administration/transfusion in the top three skills and procedures they feel uncomfortable performing independently (Casey et al., 2004; Goode & Williams, 2004; Lynn, 2014).

Nursing students have limited opportunities to practice certain skills or procedures to develop clinical competency. In nursing, clinical competency is defined as a "standardized requirement for an individual to properly perform a specific role. It encompasses a combination of discrete and measurable knowledge, skills, and attitudes that are essential for patient safety and quality patient care" (Meakim et al., 2013). However, even if a student becomes competent in a specific skill, skill decay can occur quickly if the skill is not consistently used (Maehle, Cooper, & Kirkpatrick, 2017). This reduction in skill contributes to the issue of graduate nurses not being able to perform many essential nursing skills and procedures after graduation (Roberts, Vignato, Moore, & Madden, 2009).

**Blood administration or transfusion.** Blood administration or transfusion is a medical intervention that saves lives and improves quality of life of patients. Nearly 21 million blood components are transfused each year in the United States. However, unnecessary transfusions and unsafe transfusion practices expose patients to the risk of serious adverse transfusion reactions and transfusion transmissible infections. Due to advances in donor screening, testing, data systems, and changes in transfusion practices by blood banks, the risks associated with blood transfusion continue to decrease. Overall, the number of blood product transfusion related fatalities reported to the U.S. Food and Drug Administration remain small in comparison to the total number of transfusions.

Nevertheless, advances made by blood banks to reduce the risk of blood transfusions do not mitigate risks of blood administration related to nursing and institutional practices. The most frequent errors are attributed to practitioners, environment, and institutional policies involved in the clinical transfusion process (Campbell et al., 2016). Nurses, as the primary administrators of blood products, have the final opportunity to prevent complications from transfusions, through the pre-administration bedside checks (Mole, Hogg, & Benvie, 2007; Vasiliki, 2011). Yet in 2012, 65 cases of transfusion related and potential transfusion related fatalities were reported nationally (U.S. Food and Drug Administration, 2015). Leading causes of morbidity and mortality from blood transfusions are Transfusion Related Acute Lung Injury (TRALI), hemolytic transfusion reactions, transfusion associated sepsis, and Transfusion Associated Cardiac Overload (TACO) (Goodnough & Shander, 2012; Heddle et al., 2012; Vamvakas & Blajchman, 2009). The Joint Commission recommends appropriate pre-transfusion laboratory testing, clinical indications, and vital signs and assessments be documented to improve patient safety (The Joint Commission, 2011). With improved nursing practice and documentation,

morbidity and mortality from TRALI, TACO, and transfusion reactions can be decreased. Therefore, nurses can reduce the potential for errors by developing safe blood transfusion practices, auditable performance standards, and educational programs (Campbell et al., 2016).

**Simulation.** Another recommendation to address the nursing shortage is the use of simulation in educational programs to improve confidence and competence of healthcare providers. The ways nurses trained decades ago are no longer adequate for the complex needs of the current population. An aging population, chronic conditions, mental illness, and obesity intensify patient care. Nursing preparation to practice gaps affect patient outcomes (Ajani & Moez, 2011; Cho et al., 2016). Competencies within practice have changed to include a greater need for clinical reasoning; interprofessional and collaborative communication skills; the ability to assess, implement and evaluate patient care within various health care situations; and the ability to use rapidly changing technology (National Academies of Sciences, Engineering, and Medicine, 2016). Well-developed simulation experiences can help learners gain the required competencies needed to practice safely (Flood & Higbie, 2016; Foronda, Liu, & Bauman, 2013; Jeffries & National League for Nursing, 2012; Kim, Park, & Shin, 2016; Norman, 2012; Prentice & O'Rourke, 2013).

Simulation-based learning experiences are activities that mimic the reality of a clinical environment and are designed to assist the participant in acquiring and improving knowledge, skills, clinical reasoning, affective learning, communication, and collaboration skills. The goal is increased confidence in patient care. Simulation can vary based on fidelity and resources used. Fidelity refers to the level of realism brought to the simulation experience with various resources such as manikins, room set-up, equipment, the planned scenario, and other applicable technology (International Nursing Association for Clinical Simulation and Learning [INACSL], 2016).

Within undergraduate nursing education, students practice skills prior to and as an adjunct to clinical rotations (Elfrink, Kirkpatrick, Nininger, & Schubert, 2010). In fact, high quality developed simulation experiences can be exchanged for traditional clinical experiences for up to 50% of prelicensure training (Alexander et al., 2015).

Simulations for graduate students help enhance access to multifaceted learning experiences and improve practice outcomes in the management of real life patient experiences as advanced practice nurses (Tiffen, Corbridge, Shen, & Robinson, 2011). The NLN and AACN support the use of simulation in undergraduate and graduate training to overcome barriers related to a shortage of nursing school resources, yet this will not be enough to prepare nurses for their first year in practice. Similar to simulation outcomes in nursing programs, simulation scenarios after graduation help develop new skills and transform the context of existing knowledge as nurses transition into practice (Clapper, 2010; Rhees et al., 2015). Ensuring that the nursing workforce is safe and competent will lead to quality patient outcomes.

**Summary**

This study used exploratory mixed methods action research design to identify, analyze, and mix both qualitative and quantitative data, in order to provide a better understanding of the circumstances surrounding perceived prelicensure preparation to practice gaps that graduate nurses have when performing blood administration procedures independently. One of the major strengths of exploratory mixed methods action research is the opportunity to collect many sources of data (Creswell, 2014). The various sources of data provided multiple measures of the same phenomenon, strengthening the study's validity. Qualitative research methods supported the utilization of phenomenological understanding of the participants' perspective and understanding of a situation or procedure, which in this case is blood administration. However,

qualitative methods lose the ability to generalize the results to the general population. Quantitative methods support testing theories by examining the relationships between variables, but they lack the ability to gain a deeper understanding of a specific subject. Hence, a combination of qualitative and quantitative methods provided a more complete understanding of the research problem than either approach could gather alone.

**Definition of Terms**

**Blood administration/transfusion**: The transfer of blood or blood components from one person (donor) to another (recipient) via intravenous method (Hsu, Ness, & Cushing, 2018).

**Decision making**: Cognitive processing which leads to the selection of a course of action among several alternatives (Meakim et al., 2013).

**Critical thinking**: Thought processes which entail purposeful, goal directed thinking and is based on scientific principles and methods (evidence) rather than assumptions or guesswork (Meakim et al., 2013).

**Graduate nurse**: In this study, a graduate nurse is a newly graduated nurse in his/her first role as a practicing licensed nurse.

**Hemolytic transfusion reactions**: Adverse event typically occurring during or immediately after incompatible red blood cells are transfused into a patient who possesses the corresponding antibody (Savage, 2018).

**Knowledge**: Awareness, understanding, and expertise an individual acquires from experience and education (Meakim et al., 2013).

**Nurse resident**: An individual who has graduated from a pre-licensure nursing program that is accredited by an accredited/approved state board of nursing and who is enrolled in the nurse residency program (Commission on Collegiate Nursing Education, 2015). In this study, a nurse

resident refers to a graduate nurse participating in the University of Kansas Hospital System nurse residency program.

**Nurse expert**: A nurse who is highly proficient in skills and performance and can use intuition to guide clinical judgment and decisions because of his/her background and experience (P. E. Benner, 2001).

**Performance gap:** What and how something is expected to be performed and what or how it is performed (Ajani & Moez, 2011). In this study, performance gap refers to pre-licensure preparation knowledge and graduate nurse practice/performance not meeting the expectations of the organization.

**Simulation**: A pedagogy using one or more methodologies to promote, improve, and validate a learner's progression from novice to expert (P. E. Benner, 2001; Meakim et al., 2013).

**Simulation based learning**: Various structured activities that represent actual or potential situations in education and practice that allow learners to develop or enhance knowledge, skills, and attitudes or analyze and respond to realistic situations in a simulated environment or through an unfolding case study (Meakim et al., 2013).

**Skill**: In nursing application, could be both psychomotor skills and the applied skill of nursing in actual clinical situations (Meakim et al., 2013).

**Transfusion Associated Cardiac Overload (TACO)**: When the blood administration rate is faster than the patient's circulatory system can accommodate (Vasiliki, 2011).

**Transfusion Related Acute Lung Injury (TRALI)**: An adverse reaction affecting patient's lung and respiratory status caused by a patient's leukocytes and the donor's white blood cell antibodies interacting during blood administration (Vasiliki, 2011).

**Transfusion Associated Sepsis**: Life threatening bacterial infection related to contamination of red blood cell and platelet components during donation and then transfused into a recipient (Stramer & Dodd, 2018).

# CHAPTER II: LITERATURE REVIEW

## Introduction

The purpose of this exploratory mixed methods action research study was to identify actual and perceived prelicensure preparation to practice gaps graduate nurses have performing blood administration procedures independently. An electronic review of the literature was conducted using databases available through the University of Kansas and the University of Kansas Medical Center for healthcare-specific journal availability. Databases such as CINAHL, ERIC, ProQuest, Academic Search Complete, PubMed, and Google Scholar were used to search a variety of terms. A 10-year deliberate timeframe was used unless searching for a seminal work. The literature base that has been used to frame this study comes from three groups of literature: 1) education to practice/performance gap, 2) general nurse residency programs, and 3) specific nurse residency and training procedures used to bridge the gap from academia to nursing practice.

**Education to practice gap.** Many accredited nursing programs use undergraduate nursing program curricula aligned with Quality and Safety Education for Nurses (QSEN). Quality and Safety Education for Nurses' competencies are intended to prepare future nurses with the knowledge, skills, and attitudes (KSAs) necessary to provide quality and safe patient care. Knowledge, skill, and attitude competencies are developed around patient centered care, teamwork and collaboration, evidence based practice, quality improvement, safety, and informatics. Even though the goals of nursing programs are to meet the standards required for graduation, an educational preparation to practice gap exists for new graduate nurses in blood administration procedures.

Blood administration can be taught at various points within prelicensure nursing curricula. During student nurses' training, the theoretical components of blood administration are discussed, skills taught, and attitudes of safety integrated. Adjunctive simulation experiences provide psychomotor and clinical thinking opportunities to enhance the theoretical knowledge obtained in the classroom (Mole et al., 2007).

Administration of blood products is a combination of routine skills and ability to apply effective problem-solving in rare occurrences. Verifying the physician's order and the patient's consent for administration, conducting pre-transfusion verification checks and initial patient assessments are all routine skills that require for systematic cognitive steps. However, determining an appropriate rate of administration, level of patient education, and recognition and mitigation of adverse outcomes during blood administration require various mental models and problem-solving ability that may need further guidance from experts. As new graduate nurses, the participants have been taught the basic tasks, goals, and solutions of blood administration; therefore, they already have some cognitive schemata to guide them to problem solve through the procedure. However, blood administration in the clinical environment must be performed by a licensed nurse, leaving insufficient practical experience for the student nurse (Breymier & Rutherford-Hemming, 2017; Flood & Higbie, 2016). Insufficient clinical experiences contribute to the readiness for practice gap self-reported by new graduate nurses (Slaikeu, 2011).

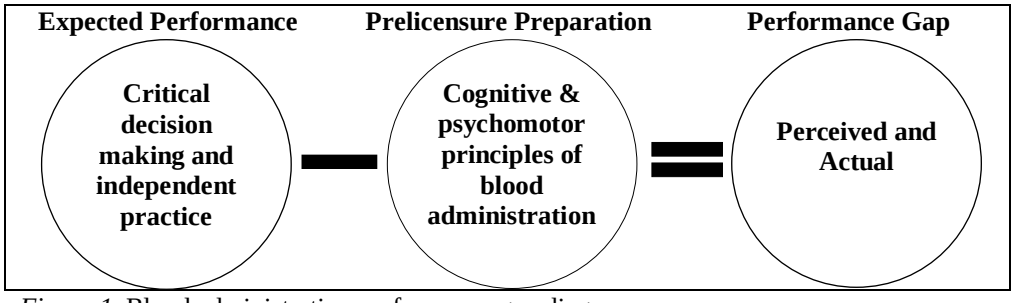


*Figure 1*. Blood administration performance gap diagram.

**Nurse residency.** Recommended nurse residency programs help transition new graduate nurses from the academic environment to the bedside (P. Benner et al., 2010; Edwards et al., 2015; Goode et al., 2016; Institute of Medicine, 2011) and identify practice knowledge gaps (Beyea, Slattery, & von Reyn, 2010; Everett-Thomas et al., 2015), which affect patient outcomes.

The experiences of the graduate nurse can provide insight into competency, confidence, and factors for positive or negative role functioning (Fink, 2003). The Casey-Fink Graduate Nurse Experience Survey© measures the experiences of new graduates and has been tested for internal consistency, reliability, and validity (Casey et al., 2004). The survey instrument is composed of demographic information, open-ended skills performance questions, Likert type comfort/confidence items, job satisfaction items, and four multiple choice questions. The survey tool grants the new graduate an opportunity to reveal experiences related to environment and transition (Fink et al., 2008), but not what factors are associated with variances in the nurse residents' responses.

## Context of the Study

At The University of Kansas Health System (TUKHS), graduate nurses take part in a one-year Nurse Residency Program. The residency program was accredited by the Commission on Collegiate Nursing Education and was designed to help new graduate nurses transition from nursing school to the fast-paced healthcare environment. Nurse residency participants meet monthly with hospital experts on topics such as patient outcomes, leadership and professional development, and patient cases, while providing them an opportunity to participate in simulation experiences and share experiences focused on a broad range of topics tailored to their assigned units. As the year progresses from months six through 12, the program shifts focus to

professional development and becoming more involved in unit projects. Unit involvement focus is evidence based practice where residents work on a project and then present a poster presentation highlighting project outcomes (The University of Kansas Hospital, 2017).

In addition to training activities in the nurse residency, graduate nurses as new employees participate in general hospital orientation and training. During general nurse orientation and training, graduate nurses learn through a combination of hands-on experiences, electronic modules, discussion of case studies, and listening to specialty speakers (The University of Kansas Hospital, 2017). Hands-on experiences may include working with chest tubes, intravenous catheters, and high-risk medication. Electronic modules are contained in the health systems learning management system. Online modules include reviewing policies, procedures, and documentation of procedures in the electronic health record. Specialty speakers include palliative care and informatics.

After general orientation, new graduates participate in unit-specific orientation with assigned preceptors and the unit educator. Unit orientation is tailored to the individual nurse's experience and clinical position (The University of Kansas Hospital, 2017). Unit-specific education may include simulation scenarios involving management of complex patients and emergencies such as cardiac arrest.

During onboarding into the TUKHS nurse residency program, all nurse graduates take the Casey-Fink Readiness for Practice survey. Casey-Fink survey results are then used to guide educational opportunities and evaluate effectiveness of the residency program. During self-assessment of readiness to practice independently, graduate nurses participating in nurse residency programs routinely rank "blood product administration/transfusion" in the top three skills/procedures they feel uncomfortable performing independently (R. Setter, personal

communication, June 27, 2016). The mean comfort level does increase with each assessment period: initial, six months, and one year; however, it was unclear what part of blood administration procedures nurse graduates feel unsure about and if their feelings are warranted based on actual performance ability. In addition, there currently isn't an alternative to assess ability other than on real patients or consistent training for all nurse graduates in safe and accurate blood administration.

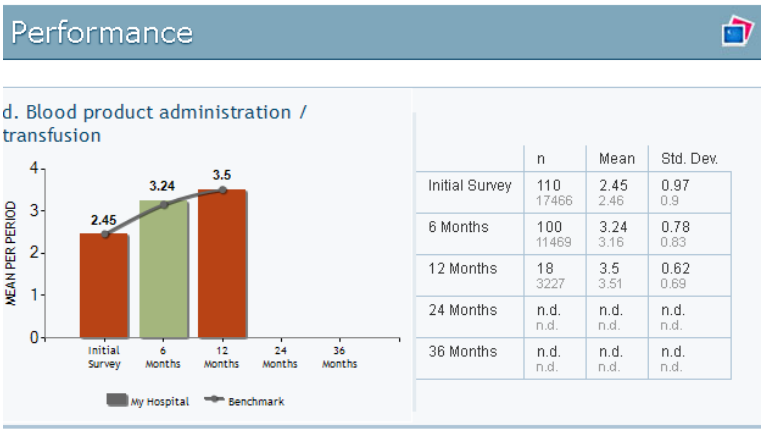


*Figure 2.* TUKH nurse residency blood administration report; Likert scale completely uncomfortable (1) to completely comfortable (4).

In the local academic teaching hospital, over 25,000 units of blood are given each year, but transfusion reactions are reported as occurring in only 1% of the transfusions, which is suspiciously low. National statistics state 1-4% of transfusions result in reactions. Even with diligent pre-transfusion screening, the local hospital's reported number of reactions was greatly below national averages. The Quality Improvement department speculated that low reports of transfusion reaction were due to an inability to recognize and treat reactions rather than an actual lack of transfusion reactions. Therefore, a randomized blood administration chart audit was done by the Transfusion Specialists to verify the speculated performance gap. The randomized chart audit, containing a simplified list of steps for blood administration, included all levels of nurses from nurse residents to experienced nurses.

Based on the randomized chart audit, the combined area most missed in the transfusion process was physical assessment (lung sounds 26% and skin check 20.8%). Morbidity and mortality related to blood transfusion reactions, which can be identified with proper physical assessment, was a significant performance gap which needs to be addressed. Therefore, the context of my study was identified integrating my interest in nurse resident readiness to practice and quality improvement with a simulation based assessment focusing on the importance of complete physical assessment with vital signs, review of TRALI and TACO risk factors, and complete documentation of nursing processes for blood administration.

Current resources at the study setting for guidance performing blood administration were procedure modeling by nurse experts, worklists, and preceptorship. During hospital orientation, graduate nurses review hospital policies and procedures as well as complete an online module developed to model the proper way to document blood administration using the electronic health record. The current policies, procedures, and electronic health record documentation for blood administration provide worklist style guidance through the procedure and unlimited access; however, the online policies, procedures, and module for blood administration do not require psychomotor engagement.

During unit orientation, graduate nurses worked with their preceptor to watch modeling behaviors and allow for close monitoring of the problem-solving process. The preceptor model has the advantages of real patient experience, think aloud cognitive processing, and just in time coaching; disadvantages include variability of practices of preceptors and limited availability of blood administration procedures, as well as risk of errors reaching the real patient. Not only are blood administration procedures limited overall, but also the rare causes of morbidity and mortality from blood transfusions TRALI, hemolytic transfusion reactions, transfusion

associated sepsis, and TACO occur even less frequently (Goodnough & Shander, 2012; Prentice & O'Rourke, 2013; Vamvakas & Blajchman, 2009). With the use of simulated experiences, routine procedural tasks as well as variability within needed tasks can be provided, helping graduate nurses build broader cognitive schema. Learners who practice under variable contextual experiences are more able to transfer learning to real experiences (Merriënboer & Kirschner, 2012).

## Theoretical Frameworks

The theoretical basis for this exploratory mixed methods research study included action research principles, four component instructional design, and Jeffries Simulation Theory. The themes identified using mixed methods will drive the recommended development of a preliminary blood administration procedural assessment for the nurse residency program.

**Action research principles.** Action research is "a problem to be investigated, a process of inquiry, and explanations that enable individuals to understand the nature of the problem. Action research can also incorporate actions that attempt to resolve the problem being investigated" (Stringer, 1996, p. 5). In healthcare, practitioners use action research to improve practices, working environments, and patient outcomes (Koshy, Waterman, & Koshy, 2011). The essence of action research principles includes: 1) gathering relevant information to build a picture or describe the situation, 2) exploring and analyzing what is happening within the situation and why they are happening, then 3) planning to implement a solution (Pershing, 2006).

**Ten Steps to Complex Learning Model.** *Ten Steps to Complex Learning* is a modified four component instructional design (4C/ID) model. The basis for 4C/ID and the Ten Steps is that complex learning design can be broken down into 1) learning tasks, 2) supportive information, 3) procedural information, and 4) part-task practice. The Ten Steps model builds on

the basic four components and focuses on practical implementation of training design, often used specifically for vocational, job-oriented, and competency-based training consistent with the healthcare industry (Merriënboer & Kirschner, 2012). This study focuses on the first two steps of the 'Ten Steps' process to operationalize blood administration steps in a simplified fashion.

Table 1 *Comparison of 4C/ID and the Ten Steps*

| 4C/ID Components | Ten Steps to Complex Learning |
|---|---|
| Learning Tasks | 1. Design learning tasks<br>2. Develop assessment instruments<br>3. Sequence learning tasks |
| Supportive Information | 4. Design supportive information<br>5. Analyze cognitive strategies<br>6. Analyze mental models |
| Procedural Information | 7. Design procedural information<br>8. Analyze cognitive rules<br>9. Analyze prerequisite knowledge |
| Part-task Practice | 10. Design part-task practice |

(Merriënboer & Kirschner, 2012, p. 23)

**Experiential Learning Theory.** Nursing clinical experiences are an example of experiential learning. Experiential learning is a continuous process, using previous experience and continually reflecting and testing new experiences (Kolb, 1984). Experiential learning explains how experience is translated using reflection into concepts, which in turn guides active experimentation and the transfer into new experiences. The patient environment provides nurses the opportunity to develop knowledge, skills, and attitudes, which can then be reflected upon for professional growth. However, due to morbidity and mortality risk for some procedures in the real patient environment, a simulated task environment can be used for learning and professional growth in a safer environment (Jeffries & National League for Nursing, 2012). The use of a simulated task environment offers a safe and controlled experience for every graduate nurse, which can improve skills leading to competency of practice (Foronda et al., 2013; Jeffries &

National League for Nursing, 2012; Norman, 2012). Simulation standards are outlined by the International Nursing Association for Clinical Simulation and Learning (INACSL). Simulation experiences are developed with the intent to learn and allow repetition of skills needed to improve nursing practice and patient outcomes; as well as keep the topic focused, relevant, and participant centered.

**Gaps in the Literature**

Several gaps in the literature were identified, which this study planned to address. Literature was scarce in graduate nurses' self-perceived performance gaps between academic knowledge and practice of blood administration. Search terms included: *performance gap; knowledge gap; practice gap; graduate nurse; nurse graduate; nurse resident; nurse intern; student nurse; blood component; blood administration; blood transfusion; and transfusion reaction*. Search terms were used individually as well as in combinations using Boolean operators *AND* and *OR*. Nurse residency programs discussed blood administration as a common procedure for which participants indicate low confidence in performing, but not specifically what part of the complex procedure leads to feel not feeling confident in performing independently.

Another gap in the literature was the lack of assessment instruments specific to blood administration and the recognition of adverse events. Additional search terms for assessment instruments included: *assessment; evaluation; instrument; tools; standards; measurement; competence; simulation based; formative; and 'knowledge, skill, attitudes, behavior*.' Search terms were used individually as well as in combinations using Boolean operators *AND* and *OR*.

**Summary**

This study was designed to do a thorough needs assessment for safe blood administration from the view of graduate nurses and nurse experts who orient them to their first nursing position

while participating in the nurse residency program. A review of literature included focus on graduate nurses' performance gaps with blood administration and assessment instruments to determine gaps in knowledge, skills, and critical decision making.

# CHAPTER III: METHODOLOGY

## Introduction

The purpose of this exploratory mixed methods action research study was to provide a better understanding of the circumstances surrounding actual and perceived performance gaps graduate nurses have performing blood administration procedures independently. This information could be used to develop a blood administration simulation assessment geared toward known and perceived gaps; guide timing and improve instructional design of blood administration training in nursing school curriculum; as well as identify nurse residency curriculum expansion opportunities. This study operationalized the first step and parts of the second step of the Ten Steps to Complex Learning framework, design learning tasks. Designing learning tasks incorporates an in-depth task analysis to clarify what was required to perform blood administration safely and independently (Merriënboer & Kirschner, 2012).

The methodology used to test the research questions is outlined in this chapter. The following is a list of the individual sections: 1) introduction, 2) role of the researcher, 3) research design, including a brief explanation of the statistical method and protection of human subject rights, 4) data collection and processing, 5) both types of participants, 6) data analysis, and 7) a summary.

## Role of the Researcher

Research bias prevents impartial considerations during any phase of research. It is important to communicate potential researcher bias particularly because of the inductive qualitative portion of this research study; the role of the researcher as the primary data collection instrument required identification of my personal values, assumptions, and biases. My perceptions of nursing as a profession, higher education nurses' education, and the study setting

have shaped my personal experiences. From July 1995 to the present I have worked as a nurse in some fashion who has impacted patient safety and care. From 2011 to 2016 I have also worked as adjunct nursing faculty in various undergraduate nursing educational settings, including most recently in the study's clinical setting. I believe this understanding of the context and role enhanced my awareness, knowledge, and sensitivity to the challenges of graduate nurses making the transition from academia to their first nursing position. I brought knowledge of both basic nursing education from the view of a professor and of the role of an experienced nurse. Attention was paid to the role of the graduate nurse and improvement of readiness to practice in a way I could recommend changes to nursing curriculum and nurse residency assessment and training.

Due to previous experiences working as adjunct clinical faculty affiliated with the study setting, I brought certain biases to this study. Although every effort was made to remain objective, these biases shape the way I view and interpret the data I collect. I approached this study with the perspective that each nurses' educational and practice experience is diverse and often difficult. With this study, I hope to make an impact on the nursing profession through the improvement of education, transition to practice, and ultimately patient outcomes.

**Protection of Human Rights**

The Institutional Review Board at the University of Kansas Medical Center approved the proposal for the study. This exploratory mixed methods action research study had all personal information removed from the data, providing anonymous data sets throughout all phases. Survey data was collected using Qualtrics© and accessed via a secured website with sign on and password. Audio recording was done via digital recorder, then downloaded to a secure folder within the hosting research site. Data was stored on KUMC secured drives.

## Research Design

The preference for exploratory mixed methodology was to do a thorough needs assessment by collecting and analyzing qualitative data from the graduate nurses themselves and the nurse experts who train them, use the data to design a preliminary assessment instrument, and then gather consensus between nurse experts. The research design for this study included: 1) gathering relevant information from various sources to describe the problem of blood administration practice gaps among graduate nurses; 2) exploring what was happening within the situation; 3) analyzing the information gathered; then 4) developing a preliminary blood administration assessment to evaluate in postdoctoral research.

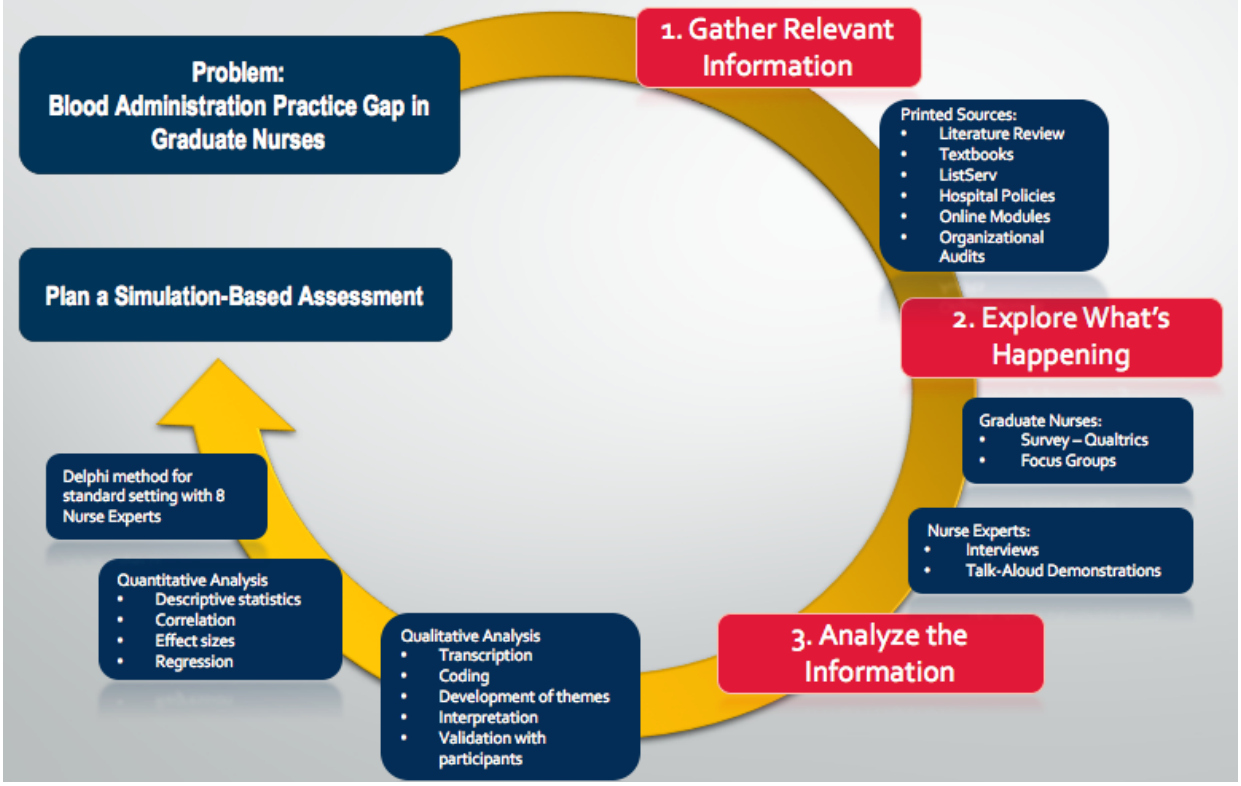


*Figure 3*. Research diagram.

**Step 1: Gathering relevant information.** Several sources of data were used to carry out this project to evaluate blood administration practice gaps among graduate nurses participating in a nurse residency program. The gathering of data was performed in three steps: 1) review of

literature, textbooks, hospital policies and modules; 2) surveys and focus groups with graduate nurses; and 3) interviews and consensus building surveys with nurse experts.

***Data sources.*** To further understand the problem of blood administration practice gaps among graduate nurses, I reviewed what new nurses should know from nursing school, what the institution requires them to know, and what the nurse graduates perceive they know. To gather information regarding what a graduate nurse should know after graduation, I reviewed nursing patient care textbooks for standards of initial instruction as outlined by the nursing accreditation agencies, the Accreditation Commission for Education in Nursing and Commission on Collegiate Nursing Education.

To collect what the studied institution expects the nurse graduates to know, I reviewed a) the hospital's intranet for available clinical resources to nurses performing the procedure; b) hospital electronic medical record (EMR) templates for current documentation processes and task aids; c) organizational blood administration audits; and d) existing assessment tools both within the organization and other nurse residency programs for evidence-based blood administration procedures.

The hospital's intranet was used to access clinical resources. Accessible clinical resources included The University of Kansas Hospital's Policy and Procedures, Lippincott Procedures, The Learning Connection (TLC), and UpToDate. The University of Kansas Hospital's Policy and Procedures resource is a concise outline of the blood administration process specific to TUKHS. The TUKHS policy and procedure resource also contains embedded links to other related policies such as Independent Double Checks; Suspected Transfusion Reaction Protocol; Massive Transfusion Protocol; available Informed Consent forms; evidence-based support citations from the Lippincott Procedures resource; and an UpToDate link for

indications for transfusions in infants and children. Lippincott Procedures provides a textbook instructional approach to blood administration. The Blood and Blood Product section starts with a *Critical Notes!* Section with specific TUKHS indications and embedded links to the Policy and Procedure resource. The embedded links between the TUKHS Policy and Procedure resource and the Lippincott Procedure resource provide coherent reference for safe procedural application irrespective of how the nurse accesses online help. The Learning Connection is an online resource for annual compliance training and contains a catalog of available courses throughout the health system. Lastly, UpToDate was an online resource of peer-reviewed clinical information which can be used for diagnosis and treatment of medical conditions.

The hospital's EMR is the documentation system for patient care. The University of Kansas Health System uses O2, a medical records program within Epic, a health management software company. O2 has a "training environment" which provides a nonpatient access version of the electronic health record to practice documentation, explore functionality, and train practitioners.

On a quarterly basis, the Infusion Safety Officers perform blood administration process quality audits. The audits were performed in a randomized fashion to identify performance gaps during blood administration of all nurses within the health system. A recent audit report was used to inform me which areas of blood administration are consistently missed or done incorrectly within the study setting. The actual audit form was used to guide the segmented parts of the procedure for the nurse resident survey and early development of this study's blood administration assessment tool.

To explore existing educational opportunities within the organization, TLC was reviewed finding only two courses: *Main Pre Post Lecture Series 11: Blood Component Transfusion* and

*O2 Blood Products Administration for ED Nurses*. A third course, *Blood Administration 2016*, was shared with me by the Transfusion Safety Officer and is a mandatory course for all registered nurses. The Main Pre Post Lecture contained a 50 minute lecture focused on the indications for patients in the Operating Room environment. The O2 Blood Products Administration for ED Nurses provided slides to show how to document blood administration in the EMR for Emergency Department patients. The mandatory Blood Administration module is a basic organizational policy and procedure review focused on the purpose of blood transfusion and nursing interventions related to administration and treatment of reactions. To examine existing organizational assessment tools, the Infusion Safety Officers provided a blood administration competency form used on some of the patient care units and an old simulation experience template used several years ago. Review of institutional support for complex tasks such as blood administration during the *gathering relevant information* step of the study was used to improve alignment of assessment criteria and nursing support of the preliminary simulation based assessment.

Other nurse residency programs and organizational programs were explored using networking and listservs. Networking with other nurse educators and simulation experts produced nine simulation experiences focusing on blood administration. The National League for Nursing Simulation listserv produced one response after two requests over an eight-month period verifying the use of a blood transfusion and allergic reaction for an Associate Degree Nursing program; however, the site was not willing to share further information. INACSL produced no responses. The Vizient/AACN Nurse Residency listserv was accessed by TUKHS Nurse Residency coordinator with my request for information regarding blood administration assessment and training. Five responses were received containing consistent low confidence

levels in blood administration by their nurse residents. Training for blood administration was mentioned in a variety of methods (no training, lecture followed by time to practice with equipment, skills lab day, low fidelity simulation of a patient hemorrhage scenario requiring mass transfusion, and online modules).

A literature review was kept current to further understand what research was being done to understand practice gaps among graduate nurses specific to blood administration. A review of printed resources to determine procedural steps, goals, and standards of blood administration was also done using nursing textbooks, hospital policies, and hospital learning modules.

Whole task sequencing is grounded on the basis that learners will quickly acquire a complete view of the whole skill that is gradually uncovered during training experience (Merriënboer & Kirschner, 2012). The whole task approach provides participants with the best opportunity to integrate knowledge, skills, and attitudes involved to successfully complete a complex skill. *Ten Steps* outlines various ways to sequence complex tasks, such as simplifying conditions, emphasis manipulation, and knowledge progression. However, based on the previous training of a nurse graduate from an accredited nursing school, sequencing for this assessment instrument will be done in a *simplifying conditions* approach.

The simplifying conditions approach is designed with the execution of all constituent skills at the same time, but under which the whole skill set changes and becomes more complex (Merriënboer & Kirschner, 2012, p. 137). During a blood administration procedure, the first task would be to verify the physician's order and prepare the patient for administration. This is the simplest version of the whole task that nurses would encounter in every patient care situation. The final task, or the most complex task, represents all real life possibilities the nurses might need to perform after the training. Examples would be identifying TACO, TRALI, or identifying

subtle blood transfusion reactions and responding appropriately in a nonverbal patient. At the completion of Step 1, a deeper understanding of the expectations of nurse graduates will be available to guide standard setting and performance objectives used during the development of a blood administration assessment.

**Step 2: Exploring what is happening.** A thorough instructional task analysis includes input from stakeholders of the situation. Step 2 extrapolates data regarding blood administration procedures from the graduate nurses' and the nurse experts' perspectives.

***Graduate nurses.*** To help answer RQ1. *Among nurse graduates, what factors are associated with variance in perceived readiness for independent practice in blood administration procedures?* and RQ2. *What curriculum and/or training characteristics within prelicensure nursing programs correlate with variation in perceived lack of readiness to practice blood administration independently?*

*Instrument*. I distributed self-reporting surveys to all current graduate nurses in TUKH nurse residency program via email with five-point Likert scales, choose all that apply, open text responses and multiple choice questions (see Appendix C). The corresponding rank was 1 as the lowest possible score (completely uncomfortable) and 5 as the highest score (completely comfortable). Undecided was also an option with a score of 3. The following questions focused on the learning sequence, learning difficulty, self-perceived learning achievement, and the number of observations of four combined parts of blood administration. The segmented parts of blood administration were a) purpose of transfusion, b) risks, c) starting and running the transfusion, and d) documentation procedures. These parts were chosen based on standards of initial instruction in patient care textbooks. Responses to learning sequence, learning difficulty, self-perceived learning achievement, and the number of observations of blood administration

during their nursing programs were used as independent variables to determine correlation with "Comfort" as the dependent variable.

The questionnaire asked participants to indicate in which of several specific periods of nursing school they had learned about blood administration in any way. Learning sequence in nursing school was asked in a "choose all that apply" multiple choice format. Options included each semester of a two semesters per year format (Year 1 Semester 1; Year 1 Semester 2; Year 2 Semester 1; and Year 2 Semester 2) with options for "Didn't Learn" and "Don't Remember." "Don't Remember" responses were coded as missing data. Learning difficulty questions continued with the same organized parts of the blood administration using a Likert scale with 1 through 5 as possible responses. The corresponding rank was 1 as the lowest possible score (extremely difficult to learn) and 5 as the highest (extremely easy to learn). This section was followed by an open text question for graduate learners to further define concepts they would like to learn more about. To further explore the amount of observational experiences with the parts of blood administration, open boxes were provided to note the number of observations of each part in their first and second years of nursing school, as well as another choice to provide observations during working shifts if applicable. Self-perceived learning achievement followed the same Likert scale with 1 through 5 as possible responses to match the difficulty of learning the concepts with their perception of learning achievement. The corresponding rank was 1 as the lowest possible score (extremely inadequate achievement) and 5 as the highest (extremely adequate).

Remaining survey questions provided demographic information such as nursing program attended, description of any previous experience, length of time in the nurse residency program, description of patient care unit and shift currently working, focus group interest, age, sex, race,

and highest level of education earned. Open text responses related to additional blood administration concepts yet to learn, nursing program, description of previous experience, and description of patient care unit, was managed within NVivo, a qualitative data program to sort codes and themes. The survey was distributed, responses paired with emails, and stored through Qualtrics©. All data was kept on secured KUMC drives.

*Focus Groups.* Twenty-five focus groups were scheduled on various days and times of day to provide graduate nurses an opportunity to reflect on their blood administration training in nursing school, concerns regarding procedure readiness, and using simulation to gather actual skill assessment information. Online Doodle scheduling links were sent to graduate nurse participants to sign up for a timeslot of their choosing with up to five participants per focus group. All focus groups were scheduled for one hour before or after a shift to limit the need for additional transportation to campus.

*Participants and Recruitment.* New graduate nurses in TUKH nurse residency program were selected for this study because, as an entrance method into the large academic teaching institution, it gave me access to many participants who were newly graduated from nursing school and had little experience with blood administration in their clinical practice because of recent graduation. Given their varied experiences with simulation as a learning modality in nursing school and being new to nursing and to the institution, I felt the graduate nurses might provide candid descriptions of their blood administration training, concerns regarding procedure readiness, and using simulation as an assessment instrument.

Besides selecting graduate nurses in the nurse residency as the participants, no attempt was made to further screen participants; therefore, the graduate nurses involved in this study

would represent a variety of different patient care units. Their demographic backgrounds would potentially resemble those of traditional new nurse graduates across the nation.

Participant recruitment occurred through secure email and welcome introductions before nurse residency classes. An email was sent to all current graduate nurses in TUKH nurse residency program with an explanation of the research and the consent for review (Appendix B). Embedded in the email was the survey link containing consent and questions.

***Nurse experts.*** Nurse experts who accurately perform the task and educators with experience teaching the learning task best identify design of a specific learning task (Merriënboer & Kirschner, 2012, p. 70). Gathering whole task information ensures graduate nurses are provided all the knowledge, skills, and attitudes needed to administer blood products accurately and safely. The importance of whole task analysis and skill decomposition before the design process is to ensure graduate nurses construct cognitive processes within their learning, which can be transferred to the real patient environment. To further identify whole task requirements, and to answer RQ3. *What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site?*, and RQ4. *What aspect(s) of blood administration do graduate nurses struggle to perform correctly as determined by study site experts?*, I recruited a) nurse experts from units with both high and rare blood administration rates and the Infusion Safety Officers for the hospital, as well as b) reviewed blood administration process quality audit data provided by the institutions' Infusion Safety Officer. A total nurse sample size of $n = 8$ was reached with sample size recommendations to find saturation of descriptions to explore the setting (Creswell, 2014).

Individual interviews of nurse experts were arranged to discuss steps of the blood administration procedure that are performed. All interviews were recorded and transcribed

verbatim. This case study approach was used to explore whole task activities to provide participants with the best opportunity to integrate knowledge, skills, and attitudes involved to successfully complete the complex skill.

As experts, procedural knowledge often becomes automated, causing unintentional omission of important cognitive decision making steps (Spector, 2016; Sullivan, Yates, Inaba, Lam, & Clark, 2014). These omissions are needed for participants to successfully perform a skill. Developing assessment instruments with the unintentional omissions forces participants to fill in the gaps by trial-and-error (Spector, 2016). Therefore, to verify completeness of cognitive and behavioral requirements for blood administration, two nurse experts were asked to perform the blood administration procedure in a recorded think-aloud method in the simulation environment (Savenye, 2014). Audio recordings were then coded and added to standard setting process to further explore clinical knowledge, action steps (skills), or decision making steps that were described during the interview process. The audio recordings of the simulation experience were transcribed, coded, and used to validate interviews through triangulation. Using the data from the nurse expert interviews and simulation think-alouds, a preliminary Task List was aggregated and analyzed during Step 3 of the study.

*Participants and recruitment.* To implement a simplifying conditions approach to blood administration, I gathered information from nurse experts working on units with various rates of blood administration as well as the Infusion Safety Officers for the hospital. Based on Benner (2001), nurse experts were defined as either a nurse who has demonstrated accurate or efficient critical clinical decision making while administering blood products to patients or nurse educators as deemed appropriate on the patient units by the nursing directors and administrators

of the hospital. These participants were chosen to further understand "what is happening" during training of nurse graduates to perform blood administration safely and independently.

Recruitment of nurse experts was done by sending a secure email to nurses in educational and leadership positions on patient care units with varying numbers of blood administration procedures. The institution's Infusion Safety Officers were also contacted, being deemed specialized nurse experts in blood administration by the organization. Emails contained an explanation of the research and the consent for review. Embedded in the email was the survey link containing consent and questions regarding availability for interviews (Appendix D).

*Instrument.* I conducted interviews which provided descriptions of step-by-step procedural and critical decision points that should occur throughout the blood administration procedure as well as potential error identification. All interviews were recorded and transcribed verbatim. Responses were coded using exact words, phrases and statements from the participants. The codes were then organized into themes based on the content. The aim of the interviews was to identify differences in approach to procedure performance related to unit experiences and to aggregate a task list to review for consensus among nurse experts in the study setting. Interview protocol for the nurse experts was guided by nurse experience and patient unit of employment; orientation processes within their unit specific to blood administration including resources used; step-by-step discussion of blood administration procedures performed on their unit; and feedback regarding what part of blood administration graduate nurses struggle with during their training (Appendix E).

**Step 3: Analyze the information.** To make sense of the data obtained during Step 2, careful inspection, preparation, and transformation of survey, interview, and standard setting information was done during Step 3 of the research. Step 3 is the process of analyzing the

information to make sense of data before planning a simulation based assessment and making recommendations for future research.

***Qualitative data analysis.*** Qualitative data analysis was used to develop a deeper understanding of blood administration training and performance gaps. Using an inductive process, I worked back and forth within the data collected. The specific foci of the nurse residents' open text survey questions were to elicit specific concepts regarding lack of confidence in their readiness to practice as well as factors which may have contributed to their perceptions. The nurse resident survey included a variety of open ended questions to answer RQ1. *Among nurse graduates, what factors are associated with variance in perceived readiness for independent practice in blood administration procedures?* Focus Groups were planned to elicit responses to answer RQ2. *What curriculum and/or training characteristics within prelicensure nursing programs correlate with variation in perceived lack of readiness to practice blood administration independently?*

The specific focus of the interviews with nurse experts and Infusion Safety Officers was to gather step-by-step procedural and critical decision points for blood administration procedures. Observations of three nurse experts performing blood administration procedures in a simulated patient environment were used to evaluate for unintended omissions within the procedure. Interviews were conducted to help answer RQ3. *What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site?* and RQ4. *What aspect(s) of a blood administration do graduate nurses struggle to perform correctly as determined by study site experts?*

Qualitative data was analyzed using a generic six step process described by Creswell (2014). The steps of qualitative data analysis are:

- Organize and prepare the data (transcription of interviews);
- Read and look at the transcription data;
- Start coding the data and write a word that represents the content;
- Use the codes to develop themes (major findings in the study);
- Describe how the themes will be represented in the research;
- Interpret the findings and validate with others.

The interviews were recorded and sent to a professional transcription service. Though the survey distributed to the nurse graduates is mostly quantitative, the free text questions were processed as qualitative data. Coding and thematic analysis of the free text responses were considered with the interview transcriptions. Once completed, the verbatim transcriptions were analyzed using the previous six step technique.

For increased internal validity, a) triangulation between nurse experts' simulation think-aloud experience and interview responses was conducted, b) nurse expert review was conducted to assess whether the study's preliminary Task List is plausible based on the data, and c) a clear description of how my background as a nurse and educator have shaped interpretation of the findings was stated (Creswell, 2014).

For qualitative reliability, a review of a) transcripts for obvious mistakes made during transcription was performed, b) data for consistency between nurse experts of various patient care units was conducted, and c) an audit trail containing clear descriptions of how data was collected, coded, themed, and how decisions were made was specified (Creswell, 2014). Since the purpose of using qualitative methods is to provide rich description of a specific site and not to generalize, the themes learned through this research are provided to demonstrate transferability to other sites if other nurse residency programs choose to embark on a similar journey.

***Quantitative data analysis.*** During Step 3 of the study, quantitative data was used to test theories regarding the relationships between variables which could affect readiness to practice

independently by gathering nominal and categorical data. The source of the quantitative data is the survey using free text, a 5-point Likert scale, and multiple choice descriptions of learning sequence, difficulty, and observational experiences throughout the graduate nurses' nursing program.

Quantitative data from frequency of responses was computed for descriptive statistics, correlation, and effect size using Statistical Package for the Social Sciences Data Analysis Systems (SPSS). I also explored relationships between variables as they differ among individual graduate nurses (Table 2). These variables included locations of nursing school training; the amount and timing sequence of learning about blood administration; how difficult they perceive the concepts of blood administration to be; how many observations they had and at what point in their nurses training; level of comfort with blood administration; and demographics. RQ1. *Among nurse graduates, what factors are associated variance in perceived readiness for independent practice in blood administration procedures?* RQ2. *What curriculum and/or training characteristics within prelicensure nursing programs correlate with variation in perceived lack of readiness to practice blood administration independently?*

Table 2 *Level of Comfort Variables*

| **Outcome Variable** | **Predictor Variables** |
|---|---|
| Casey-Fink Level of Comfort | Previous Experience<br>• Observational experiences<br>• General Healthcare experiences |
| | Previous Learning Experience<br>• Sequencing of learning activities<br>• Perceived learning difficulty<br>• Perceived learning achievement |
| | Residency Experience<br>• Length of time<br>• Unit and shift |
| | Nursing School Experience<br>• Specific nursing program<br>• Type of nursing program |

**Step 4: Plan a simulation based assessment.** From both the qualitative data and the quantitative data, a focused needs analysis emerged providing many facets to incorporate into a preliminary blood administration task list.

***Delphi method.*** The Delphi method, originally developed in the 1950s, was used as a way of gathering opinions from experts. Using the Delphi method provides a structured communication approach to gather consensus while maintaining anonymity of the participants. A minimum of two survey rounds is needed to allow for discussion and resubmission to the experts for feedback. Each round contains a summary of the responses, percentage of support on each item, and comments from the previous round. The final round is for endorsement.

In this study, blood administration phases were made based on the action research approach of this study to be consistent with Steps 1 and 2 data outcomes. Phases of blood administration were:

- Preparation procedural steps;
- Pre-Transfusion Verification;
- Blood Administration;
- Post-Transfusion;
- Documentation;
- Adverse Outcomes (transfusion reactions, TACO, and TRALI).

Each step of the task list was its own multiple choice question with free text space for comments on each step and at the end of each phase of the blood administration process. The task list was incorporated into a Qualtrics© survey tool, and the link was sent to the nurse experts. Experts were asked to submit their responses within 5-7 days to expedite tabulation and future rounds.

Round 1: (Appendix F)

- Coded whole task procedural steps were distributed to nurse experts via secure Qualtrics© link to review accuracy of interview coding, task order, step type, and standard setting;
- Step type could be more than one choice;
- Standard setting could only be one choice;
- Free text areas were available for comments regarding order and accuracy of task list;

- Results were tallied from Qualtrics© and reviewed for consensus.

| Step Description | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Verify physician order for blood component. Order blood if standing orders apply. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

*Figure 4.* Round 1 standard setting table example.

Round 2: (Appendix G)

- Comments from Round 1 were used to alter the task order and wording of the Task List for Round 2;
- Step type was not carried into Round 2 as it was used for feedback only;
- Standard settings not meeting consensus were given a proposed solution with comments made by experts to review and consider;
- Items meeting consensus were displayed as the standard chosen;
- Updated Task List was distributed to nurse experts via email for comments and agreement;
- Researcher will repeat with subsequent rounds until consensus is reached (Jones & Hunter, 1995).

Round 3: (Appendix H)

- Comments from Round 2 were used to alter the task order and wording of the Task List for next round;
- Each step's wording was given a proposed final solution with comments made by experts to review and consider;
- Items were displayed as the standard chosen;
- Updated Task List was distributed to nurse experts via email for comments and agreement.

Notes were kept of all facilitation required during each round and decision-making regarding items meeting consensus as part of the data collection procedure. Notes were stored in a secure KUMC file. Getting consensus of blood administration procedures was planned to be time intensive because it required more than one round with the nurse experts. Consensus was defined as agreement of at least 6 of the 8 nurse experts (75%) for each task. Any additional comments not related to clarification for the Delphi process to meet consensus were considered and processed with the qualitative data analysis. Working toward answering RQ3. *What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site?,* the final results of the Delphi process,

performed by the nurse experts, was used to collect content validity of each task when meeting consensus.

## Summary

Results from this study include a deeper understanding of what part of a blood administration procedure graduate nurses and nurse experts feel lead to performance gaps and lack of readiness to perform independently.

# CHAPTER IV: GRADUATE NURSE SURVEY RESULTS

## Introduction

This chapter provides graduate nurse demographic characteristics as well as quantitative analysis of the graduate nurse survey. The results from the quantitative portion consist of descriptive statistics related to each step in the analysis, which describe the sample and variables that are measured. The results of the qualitative portion refer to nurse graduates' open text survey responses. Coding from the open text responses in the nurse graduate survey was used to understand what educational requests participants had regarding blood administration and types of previous healthcare experiences prior to nursing licensure. In-depth mixed method results are reported for the examined questions: (1) Among nurse graduates, what factors are associated with variance in perceived readiness for independent practice in blood administration procedures? and (2) Which characteristics of learning experiences during prelicensure nursing programs correlate with perceived lack of readiness to practice blood administration independently?

## Demographic Results

A total of 262 nurse residents participated in TUKHS nurse residency program with 55% participation in my study ($n$ = 143). Of the participants, 82.5% ($n$ = 118) were in the first three months of their nurse residency when they completed the survey, and the remaining 17.5% were in the 4-6 month range. The median age was 23 years of age with a range of 20-50 years of age with four missing. The majority of participants identified with the White/Caucasian race ($n$ = 125, 87.4%) and the female sex ($n$ = 133, 93%), showing consistency with national nurse residency statistics. The majority reported Bachelor's Degree in Nursing ($n$ = 137, 95.8%) as their highest degree. Forty nursing programs were represented in the study; the majority of

learners came from traditional 4-year Bachelors of Nursing programs (*n* = 133, 93%) located in the Midwest. Nursing programs were not compared because of predominant representation from one school, the University of Kansas Nursing School.

Twelve types of patient care units were represented, the highest percentage of nurse residents working on medical (*n* = 29, 20.3%) and surgical (*n* = 28, 19.6%) patient type units. Fifty-two percent of the participants work night shifts (*n* = 74), 45% day shifts (*n* = 64), and the remaining work a variety of shifts. When the demographic variables were examined, there were no statically significant differences identified between the type of patient care unit and shifts worked.

Table 3 *Types of Patient Care Units*

| Patient Care Units by Type | Frequency | Percent |
|---|---|---|
| Emergency Department | 4 | 2.8 |
| Float Pool | 15 | 10.5 |
| Medical | 29 | 20.3 |
| Medical ICU | 4 | 2.8 |
| Mom Baby | 4 | 2.8 |
| Oncology | 10 | 7.0 |
| Operating Room | 19 | 13.3 |
| Pediatrics | 5 | 3.5 |
| PrePost | 7 | 4.9 |
| Rehab | 2 | 1.4 |
| Surgical | 28 | 19.6 |
| Surgical ICU | 16 | 11.2 |
| Total | 143 | 100.0 |

## Qualitative Results

The open text nurse resident survey questions were used to answer research question 1) "Among nurse graduates, what factors are associated with variance in perceived readiness for independent practice in blood administration procedures?" by coding responses to the question

*Q4 Please list any other concepts related to blood administration you would like to learn more about* and *D1.1 Please describe your previous health related experience.* Focus Group questions were to provide an iterative approach to answer research question 2) "What curriculum and/or training characteristics within prelicensure nursing programs correlate with perceived lack of readiness to practice blood administration independently?"

Twenty-one open text responses were coded regarding requested areas of additional blood administration education and sorted into ten themes. One hundred fifteen open text responses were coded regarding previous experience prior to licensure and sorted into 17 themes.

Twenty-five focus groups were scheduled on various days and times of day to provide graduate nurses an opportunity to reflect on their blood administration training in nursing school, concerns regarding procedure readiness, and using simulation to gather actual skill assessment information. Unfortunately, the use of emailing Doodle invites and the time availabilities of the focus groups resulted in three participants scheduling for different times and days, and only two of those participants showed up.

**Themes**

**Additional needs.** Initial coding of graduate nurses' open text responses to question four in the survey was done using the participants' own words to sort into themes to understand in what areas of blood administration they needed more education. Content included the whole process of blood administration ($n$ = 2); individual steps of the process ($n$ = 5); organizational process specific to TUKHS ($n$ = 1); and other options to blood administration for fluid expansion ($n$ = 1). Example comments include:

- "Everything because we were taught at my school second semester and it was very quick and not much depth."

- "The entire process from start to finish. I would just like more practice doing this with a nurse so I can feel comfortable on my own."
- "The whole step by step process."
- "The right way to administer Albumin. I've had to call pharmacy a couple times because there isn't a set protocol for it and the package instructions aren't clear."

**Previous experience.** Initial coding of graduate nurses' open text responses to demographic question one was done using de-identified participants' responses and collaborating with a TUKHS nurse familiar with various pre-licensure employment opportunities. Descriptions were cleaned and coded into similar experience and then sorted into categories. When multiple experiences were listed, the participant was coded to the highest appropriate category. Categories were identified relative to potential exposure to blood administration as an observer: 1) None; 2) Minimal; 3) Some (Table 3). When previous experience occurred in locations outside of the hospital or their position didn't correspond with direct patient care, it was coded into the category *None*, but if the previous experience occurred in the hospital or with critically ill patients, they were sorted into the *Minimal* category. Only two experience types met the *Some* category, which corresponded with direct patient care in the hospital working directly with a licensed nurse or in areas where they might be in direct sight of blood administration.

Table 4 *Graduate Nurse Previous Experience Thematic Analysis*

| Category | Meaning | Experience Type |
|---|---|---|
| None | No opportunity for blood administration observation based on experience location and type of work done. | Chiropractic Assistant<br>EKG Tech<br>Home Health Aide<br>LPN<br>Medical Assistant<br>Nursing Assistant Long-Term Care<br>Unlicensed Hospital Assistant<br>Pharmacy Tech<br>Psych Tech<br>Rehab Aide<br>Respiratory Tech<br>Volunteer |

| | | |
|---|---|---|
| Minimal | Little to no opportunity for blood administration observation based on location and work done. | Nursing Assistant Acute Care<br>Paramedic |
| Some | Potential opportunity for blood administration observation based on location and work done. | Nurse Extern<br>Surgical Tech |

## Quantitative Results

**Comfort with blood administration.** Graduate nurses were asked their comfort with blood administration using a 5-point Likert scale. Mean Comfort with Blood Administration was 3.1 out of 5 (SD = 1.203).

**Learning sequence.** Correlations with "Comfort" were explored using two separate ways of aggregating learning sequence responses: 1) learning about blood administration in a recent semester before graduation might matter, and 2) the more semesters a participant learned about blood administration might matter. Each segmented part of blood administration was individually examined for correlation with "Comfort" as the dependent variable. No segmented parts of blood administration were statistically significant when correlated with "Comfort" and considering either recent semesters of learning sequence or more semesters of learning.

Table 5 *Comfort when correlated with Learning Sequence - Recent Semesters Matter*[*]

| | | | **Learning Sequence: "Recent Matters"** | | | | |
|---|---|---|---|---|---|---|---|
| | | **Comfort** | **Purpose** | **Risks** | **Starting Infusion** | **Assessment** | **Documentation** |
| Comfort | Pearson Correlation | 1 | -.059 | -.089 | -.002 | -.092 | -.006 |
| | Sig. (2-tailed) | | .507 | .302 | .984 | .288 | .944 |
| | N | 143 | 129 | 135 | 131 | 135 | 126 |

[*]Recent semesters matter = the closer to graduation the more probable to correlate with comfort.

Table 6 *Comfort when correlated with Learning Sequence - More Semesters Matter*[*]

| | | | **Learning Sequence: "More Matters"** | | | | |
|---|---|---|---|---|---|---|---|
| | | **Comfort** | **Purpose** | **Risks** | **Starting Infusion** | **Assessment** | **Documentation** |
| Comfort | Pearson Correlation | 1 | .055 | .029 | .124 | .018 | .102 |
| | Sig. (2-tailed) | | .537 | .735 | .160 | .833 | .257 |
| | N | 143 | 128 | 135 | 130 | 135 | 126 |

[*]More semesters matter = the more semesters blood administration covered the more probable to correlate with comfort.

**Learning difficulty**. Descriptive statistics were examined for perceived learning difficulty in each part of blood administration.

Table 7 *Means - Perceived Learning Difficulty by blood administration step*

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Learning Difficulty Purpose | 143 | 2 | 5 | 4.00 | .864 |
| Learning Difficulty Risks | 143 | 1 | 5 | 3.57 | .968 |
| Learning Difficulty Starting Transfusion | 143 | 1 | 5 | 3.17 | .981 |
| Learning Difficulty Assessment | 143 | 1 | 5 | 3.34 | 1.001 |
| Learning Difficulty Documentation | 143 | 1 | 5 | 3.13 | .999 |

Perceived Difficulty with each segmented part of blood administration was individually examined for correlation with "Comfort" as the dependent variable. Positive correlation at the p< .01 level was found in "Starting a Transfusion" and in "Assessment" and at the p< .05 level for "Documentation." No correlation was found between "Comfort" and difficulty with understanding "Purpose" or "Risks" of blood administration.

Table 8 *Comfort when correlated with Perceived Learning Difficulty*

| | | | Learning Difficulty | | | | |
|---|---|---|---|---|---|---|---|
| | | Comfort | Purpose | Risks | Starting Infusion | Assessment | Documentation |
| Comfort | Spearman's rho | 1 | .112 | .141 | .305** | .227** | .175* |
| | Sig. (2-tailed) | | .183 | .093 | .000 | .006 | .036 |
| | N | 143 | 143 | 143 | 143 | 143 | 143 |

** p< .01, * p< .05

**Learning achievement.** Descriptive statistics were examined for perceived learning difficulty in each part of blood administration.

Table 9 *Means - Perceived Learning Achievement by blood administration step*

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Learning Achievement Purpose | 143 | 1 | 5 | 4.01 | .964 |
| Learning Achievement Risks | 143 | 1 | 5 | 3.86 | .893 |
| Learning Achievement Starting Transfusion | 143 | 1 | 5 | 3.31 | 1.127 |
| Learning Achievement Assessment | 143 | 1 | 5 | 3.60 | 1.049 |
| Learning Achievement Documentation | 143 | 1 | 5 | 3.18 | 1.173 |

Self-perceived learning achievement with each segmented part of blood administration was individually examined for correlation with "Comfort" as the dependent variable. Positive correlation was found at the p< .05 level in "Starting Transfusion," "Assessment," and "Documentation." No discernible correlation was found with "Comfort" and self-perceived learning achievement with understanding "Purpose," or "Risks," of blood administration.

Table 10 *Comfort when correlated with Self-Perceived Learning Achievement*

| | | | **Perceived Learning Achievement** | | | | |
|---|---|---|---|---|---|---|---|
| | | **Comfort** | **Purpose** | **Risks** | **Starting Infusion** | **Assessment** | **Documentation** |
| Comfort | Spearman's rho | 1 | .119 | .141 | .212* | .203* | .172* |
| | Sig. (2-tailed) | | .159 | .093 | .011 | .015 | .040 |
| | N | 143 | 143 | 143 | 143 | 143 | 143 |

* p< .05

Cross-tabulation was done between "Learning Difficulty" and self-perceived "Learning Achievement" to explore whether segmented parts of blood administration perceived more difficult reached achievement and at what level of achievement was reached. Five-point scales for each were minimized to three-point scales leaving difficult, neither difficult nor easy, easy to learn and inadequate, neither inadequate nor adequate, adequate achievement as the reference points. Colors within the table are relative to the participants' responses, not the frequency of responses. For example, instructors would want all perceived achievement levels to be 'green' meaning the learners adequately learned each concept regardless of how difficult the concept was to learn, instead of somewhere else in the gradient closer to red. Red means each concept of blood administration was difficult to learn and perceived to be inadequately achieved by the learner. Areas of learning difficulty which met 80% self-perceived learning achievement were "Purpose" (80.9%, n = 116) with "Risk" (n = 112) meeting achievement at 78.3%. However, "Starting Transfusion" (56.7%, n = 81); "Assessment" (69.3%, n = 99); and "Documentation" (51.1%, n = 73) did not.

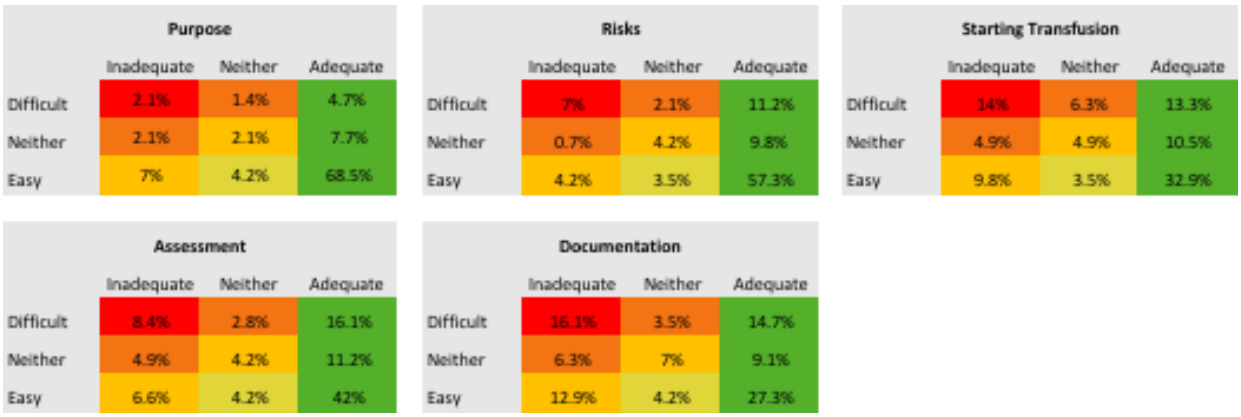


*Figure 5.* Cross-tabulation Difficulty with Achievement

**Observational experiences.** Total observational experiences segmented by parts of blood administration were individually examined for correlation with "Comfort" as the dependent variable. Positive correlation at the $p < .05$ level in "Assessment" and "Completion" were found when total observations per part were combined in nursing school. No correlation was found with "Comfort" and total observations in "Starting" or "Documentation" of blood administration.

Table 11 *Comfort when correlated with Total Observation Experiences by Step*

| | | | Total Observation Experience | | | |
|---|---|---|---|---|---|---|
| | | **Comfort** | **Starting Infusion** | **Assessment** | **Documentation** | **Completion** |
| Comfort | Pearson Correlation | 1 | .140 | .164* | .128 | .168* |
| | Sig. (2-tailed) | | .096 | .050 | .129 | .044 |
| | N | 143 | 143 | 143 | 143 | 143 |

* $p < .05$

Confidence intervals were analyzed for Total Observation's correlation with each subtask, as follows: "Starting a Transfusion," 95% CI: [-.025, .297]; "Assessment," [ -.0002, .320]; "Documentation," [ -.037, .286]; and "Completion," [.004, .323]. When observational experiences with blood administration were summed across all observation variables and divided by the number of steps, no statistically significant correlation was found.

Table 12 *Comfort when correlated with Total Observation Experiences Summed across all steps*

| | | Comfort | Total Observation Experience |
|---|---|---|---|
| Comfort | Pearson Correlation | 1 | .150 |
| | Sig. (2-tailed) | | .074 |
| | N | 143 | 143 |

**Previous healthcare experience.** Graduate nurses were asked to disclose if they had previous healthcare experience prior to licensure as an independent variable to correlate with "Comfort." Eighty percent of participants had previous experience prior to licensure ($n$ = 114) which were coded into 17 themed types of experience. A majority of participants with previous experience were Nursing Assistants in acute care (48%, $n$ = 55) and Nursing Assistants in nonacute care (18%, $n$ = 21), patient care areas which require significant amounts of hands-on patient care.

Table 13 *Graduate Nurses' previous healthcare experience*

| Experience Type | Frequency | Percent | Valid Percent |
|---|---|---|---|
| Behavioral Health Tech | 1 | .7 | .9 |
| Chiropractic Assistant | 1 | .7 | .9 |
| EKG Tech | 1 | .7 | .9 |
| Home Health Aide | 3 | 2.1 | 2.6 |
| LPN | 1 | .7 | .9 |
| Medical Assistant | 1 | .7 | .9 |
| Multiple Types | 17 | 11.9 | 14.8 |
| Nurse Intern | 5 | 3.5 | 4.3 |
| Nursing Assistant (Acute) | 55 | 38.5 | 47.8 |
| Nursing Assistant (Non-Acute) | 21 | 14.7 | 18.3 |
| Pharmacy Tech | 1 | .7 | .9 |
| Rehabilitation Aide | 3 | 2.1 | 2.6 |
| Respiratory Tech | 1 | .7 | .9 |
| Surgical Tech | 2 | 1.4 | 1.7 |
| Unlicensed Hospital Assistant | 1 | .7 | .9 |
| Volunteer | 1 | .7 | .9 |
| Total | 115 | 80.4 | 100.0 |

The 17 themed types of experiences were coded into three levels of potential exposure to patients actively receiving a blood transfusion. Only 5% of the participants ($n$ = 7), which included nurse interns and surgical technologists, had some potential exposure. A majority of the participants (64%, $n$ = 91) had only minimal chance of exposure, with the remaining having no potential

exposure to blood administration during their previous healthcare experiences. A one-way between groups ANOVA was conducted to compare the effect of previous experience on "Comfort," showing no statistical significance at the $p < .05$ level [$F(2, 111) = 1.109$, $p = .333$].

**Summary**

This chapter described the mixed methods approach to analyzing the graduate nurse survey responses. Since there are gaps in the literature regarding specific curricula training characteristics, this data will be used for further exploration and discussion in future research. The qualitative findings in the survey show previous experience descriptions which require significant amounts of hands-on patient care but minimal potential for direct participation in blood administration. The quantitative results indicate that graduate nurses were only somewhat comfortable with blood administration in their first six months of nurse residency, consistent with nurse residency listserv responses and in-house nurse residency statistics. Between groups analysis shows no statistical difference. The correlation results of the analysis are displayed in the table below.

Table 14 *Quantitative survey results*

| Outcome Variable | Predictor Variables | Statistical Significance using Pearson Correlation |
|---|---|---|
| **Casey-Fink Level of Comfort (M = 3.1, SD = 1.20)** | **Previous Experience** | |
| | Observational experiences | Total Observation of Assessment [r = .164, *n* = 143, p < .05], Total Observation of Completion [r = .168, *n* = 143, p < .05] |
| | General Healthcare experiences | *n.s.* |
| | **Previous Learning Experiences** | |
| | Sequencing of learning activities | *n.s.* |
| | Perceived learning difficulty | Starting a Transfusion** [rho = .305, *n* = 143, p < .01], Assessment** [rho = .227, *n* = 143, p < .01], Documentation* [rho = .175, *n* = 143, p < .05]. |
| | Perceived learning achievement | Starting a Transfusion* [rho = .212, *n* = 143, p < .05], Assessment* [rho = .203, *n* = 143, p < .05] Documentation* [rho = .172, *n* = 143, p < .05], |
| | **Residency Experience** | |
| | Length of time | *n.s.* |
| | Unit and Shift | *n.s.* |
| | **Nursing School Experience** | |
| | Specific nursing program | *n.s.* |
| | Type of nursing program | *n.s.* |

** p< .01, * p< .05

# CHAPTER V: NURSE EXPERT INTERVIEW RESULTS

## Introduction

This chapter provides demographic characteristics as well as the results for the qualitative analysis of the nurse expert interviews. This section gives explanation to the nurse experts' interviews, along with open text responses during the blood administration standard setting procedure.

Codes from the nurse expert interview questions were used to establish credibility of nurse experts, understanding of unit characteristics including patient acuity and common procedures, and training and orientation procedures for new graduate and experienced nurses. The focused blood administration interview questions were based on the Infusion Safety Audit form phases of blood administration: Preparation; Pre-Transfusion Checks; Administration of Blood Component; Post-Transfusion; Documentation; and Adverse Outcomes. Coding from the focused questions was used to understand compliance between nurses on various units with the hospital policy. Remaining questions allowed nurse experts to discuss difficult steps in the blood administration process as well as aspects of blood administration that new graduate and experienced nurses struggle to perform. Transcription of the think-aloud demonstrations was used to validate previous interview data analysis and capture missed steps previously verbalized.

## Demographic Results

The eight nurse experts interviewed had experience ranging from 2.5 years to 34 years. Three nurses worked a majority of shifts as a staff nurse, three nurses worked a majority as unit coordinator, and two nurses worked for Infusion Safety Management Services. All nurses had a minimum of a Bachelor's Degree in Nursing with three nurses having a Master's Degree (2

Nursing and 1 Business) and one nurse working on a Doctorate in Nursing Practice. All 8 nurse experts were women.

## Qualitative Results

The research questions guiding the nurse expert interview portion of this study were: "What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site?" and "What aspect(s) of a blood administration do graduate nurses frequently struggle to perform independently as determined by study site experts?" Qualitative description was used to describe the interview data from each nurse expert.

## Themes

Initial coding of nurse experts' interviews was done using the participants' own words to sort into descriptive and thematic understanding of the 1) Setting; 2) Situation; 3) Strategy; 4) Perspectives; 5) Activity; 6) Practice Variation; 7) Relationships; and 8) Recommendations as described by the nurse experts. Within each theme distinct concepts emerged based on the role of the nurse expert, the patient unit on which the expert is currently working, and variability of experience.

Table 15 *Nurse Expert Interview Thematic Analysis*

| Theme | Meaning | Concepts |
|---|---|---|
| Setting | Statements describing context of the study site | • Patient Unit<br>• Acuity |
| Situation | Statements describing the setting | • Types of work experience<br>• Frequency of blood administration |
| Strategy | Statements describing frequent nursing activities | • Audits<br>• Blood Administration Education<br>• New employee orientation |
| Perspectives | Statements describing specific aspects of the setting and participants understanding of the setting | • Policies & Procedures<br>• Available resources<br>• Barriers to procedure |
| Activity | Statements describing regularly occurring situations | • Development of blood administration policies |

| | | |
|---|---|---|
| | | • Blood administration steps |
| Practice Variation | Statements describing infrequent situations/activities | • Specific examples of rare occurrences<br>• Variances in practice |
| Orientees | Statements describing types of employees hired | • Nurses with experience<br>• Graduate nurses (Nurse Residents) |
| Recommendations | Statements describing suggested improvements to context | • Process improvements to blood administration |

**Setting**. This study references Setting as TUKHS and the various patient care units where each nurse expert works. The interviews allowed each nurse expert to describe her unit and the types of patients cared for as well as ratio of patients to nurse.

The first concept that emerged from the analysis was the variety of patient care units worked by the nurse experts, yet all were satisfied with the staffing levels for patient care. Each nurse expert worked on a different type of unit, from family practice medical care with a low acuity to trauma intensive care with high acuity. The other concept was related to acuity. Low acuity patients require less intensive nursing care, leading to 3-4 patients to one nurse and an unlicensed nursing associate to two nurses to help with baths and call lights. The higher the acuity, the more constant nursing observation and care is required, the trauma intensive care unit (ICU) therefore requiring one nurse for every 1-2 patients. Regardless of unit, each shift is readjusted for patient-to-nurse ratios based on current patient acuity. Nurse experts were satisfied with the average patient-to-nurse ratio:

- "Almost every day shift, it's three patients to a nurse. Night shift is a little bit dicey. But, it's much better than the national average."
- "As a unit coordinator, I rarely take patients. I do get pulled in to take patients from time to time, most of our nurses are two patients to one nurse."
- "Recently, we had a patient that was so busy the charge nurse took a nonbusy patient so one nurse could have three patients because of how busy one patient was."

**Situation.** To further explain the Setting, nurse experts described their work experiences and the average amount of blood components given within their current practice. Work experiences varied in multiple ways: years of experience; type of patient care (general medical care to intensive care); specialties (perioperative to transplant services); and role (staff nurse to director). All nurses had experience administering blood components but a variety of experience in frequency of administration. Nurses from the lower acuity patient units gave blood infrequently, while nurses on higher acuity units gave multiple units per shift. Infusion Safety Officers didn't administer blood products but monitored nursing practices within the Setting.

- "I probably give blood a couple of times a month."
- "A lot of blood products. Liver transplant patients are at higher risk for bleeding, so they require quite a bit of blood products prior to and after."
- "I would say that probably red blood cells are the most common thing we give. I feel like at least once a week, at least one patient will get blood."

**Strategy**. Based on the various Situations of the nurse experts, strategy themes presented themselves. Two of the nurse experts worked in the Infusion Safety Department lending their strategies of blood administration collaborating with the blood bank and quality improvement for updated evidence based practices and competency development, updating policies and procedures, and disseminating updated information to all nurses within TUKHS.

- "There's an annual competency that gets done, all nurses have to do that. What should happen, of course, is when they go to the unit, it should be part of the orientation with the preceptor. The educators make it up, they get my input."
- "So, there's a TLC (online module) every year, so education that the nurses have to do for blood."

The remaining six nurse experts shared strategies to maintain up-to-date education on blood administration and provide orientation to new employees, both experienced nurses and graduate nurses. Blood administration education for the experienced nurses included various modalities. Three nurses discussed annual competencies within online modules, and three nurses discussed additional competency requirements with massive transfusion protocol. Only one nurse mentioned the "Bloody Truth," a flyer form of updated blood administration education developed by the Infusion Safety Department and disseminated via email and often posted in high traffic areas on the patient unit. Only four nurses mentioned referencing the online TUKHS policy, with all nurse experts preferring to use the online Lippincott blood administration reference. Additional blood administration resources included using a "badge buddy," contacting the blood bank when needing additional help with blood administration policy, and pharmacy regarding timing medications around administration delays.

- "Lippincott is easier than Policy Stat to find stuff; but the Policy Stat is hospital specific. So, you're still supposed to follow the policy first. I think that's also confusing because they're resources, they do say some conflicting things."
- "A nice feature of Lippincott policy is that at the beginning, it starts with critical notes. So, it has kind of the bullet points of the most important things."
- "I have looked at the Lippincott policy for sure. I would say that's probably what we go off of."

Though length of orientation was consistent between patient units, orientation methods for new nurses to blood administration at TUKHS varied. All nurse experts mentioned the nurse residency program for graduate nurses and the use of competency journals to monitor readiness to practice independently.

- "I want to say it's around 12 weeks, that includes the hospital orientation and all the staff on the unit. Then for more experienced nurses, I believe it's closer to eight weeks to get through everything."
- "The orientation is competency based. The length is different based on if you have experience. If you're an internal employee, there's certain things they know. New grads are getting the full thing. I believe it's the same checklist for everyone. The preceptor on each shift addresses the checklist with the orientee throughout the shift."
- "So, in addition to talking about the procedure, the preceptor pulls up the policy and has the orientee read through the first time in terms of what needs to be done and has them prepare for the whole process before starting it."
- "Especially if getting near the end of orientation, it might be like, 'Hey, I know you're giving blood, and this person hasn't done it before. Could you call them before you do it so they can come and be part of this?'"

**Perspectives**. Further inquiry into chosen Strategies for orienting new nurses was coded as nurse experts' Perspectives on specific aspects of the study setting. All nurses encouraged their orientees to reference a blood administration policy prior to initiating the transfusion; however, the majority preferred Lippincott instead of TUKHS online policy for blood administration. Upon further questioning, not all nurse experts knew the difference between Lippincott and the hospital's policy manual for blood administration process or priority of one over the other. For example:

- "I think that our policies and procedures have two separate spots, so we have procedural policies in Lippincott, and then we have like other policies in 24/7. I can't tell you the exact process; frankly, I can't tell you which one's which."

- "I feel like Lippincott is specifically tailored to questions when it comes to types of skills, or things that I'm doing with and for the patient. Where the Policies and Procedures would be like, if I'm a charge nurse and someone wants to bring in their dog."

When asked what part of blood administration orientees often found difficult, all nurse experts discuss specific barriers to practice. The Infusion Safety Officers mentioned assessments as the most difficult area for nurses. This was based on randomized transfusion audits which consistently showed an absence of performing or documenting vital signs and/or physical assessments.

- "They have difficulty with making sure that vital signs and assessment is done prior to ordering [blood]."

Nurse experts performing patient care felt transfusion reaction recognition or the fear of a transfusion reaction during administration was the most difficult part of blood administration which may lead to new nurses' lower level of comfort.

- "It's the new grads are afraid that they wouldn't be able to recognize a transfusion reaction. It's that safety component that I think is the most nerve racking for all of them."
- "Management of a transfusion reaction, I would guess because I've only done it once, even though I've given a lot of blood production. I'm still definitely going to pull up the policy."

**Activity.** Participants' statements which described regularly occurring situations with blood administration were coded into the Activity theme. Two concepts emerged based on the work activities of the participants: development of blood administration policies by the Infusion Safety Officers, and blood administration steps by the patient care nurse experts.

Infusion Safety Department activities focused around their strategies of blood administration to auditing TUKHS practices, collaborating with the blood bank and quality improvement for updated evidence based practices and competency development, updating policies and procedures, and disseminating updated information to all nurses within TUKHS.

- "The first thing I did when I came here [TUKHS] was develop the audit tool, because when I looked at the one they had it was all about the Blood Bank. You have to be able to see how they actually do what they do in an audit. Some things you can go back and look at the chart, but other things you can't. Because of that, it's a tedious process to audit a transfusion, but you find out a ton when you do."
- "I go into the policy, send it out to all the educators as I'm changing it and I ask for things you've seen, things you want to change, things you spend a ton of time with."
- "We try to figure out what is going to be most impactful. So, we have done what we call "*The Bloody Truth."* These little blitzes come out when there's something that we think is important."

Nurse experts participating in direct patient care discussed blood administration on their unit and any unit specific policies related to patient population. All the nurse experts had a comprehensive understanding and verbal recollection of the blood administration policies and procedures. When asked to talk through the phases of blood administration (preparation, pre-transfusion checks, administration, post-transfusion, documentation), all nurse experts could articulate the steps within each phase. Massive Transfusion Protocol is a specialized procedure used to give multiple units at one time to a critically ill patient. Only three nurse experts could articulate the process for Massive Transfusion Protocol based on their current patient unit and required competency checks. In addition, all nurse experts clearly discussed how to assess and

manage a patient suffering a transfusion reaction, but only five nurse experts discussed TACO and TRALI during their discussion of caring for a patient having adverse reactions to blood administration. Only four nurse experts discussed providing education to the patient before and during the procedure.

- "Basically, once I have checked in the patient, I tell them 'Hey, this is what's happening. This is how the process is going to go. If you have any of these symptoms...', which I usually read the symptoms to the patient off the paper."
- "I start with, 'Has the physician told you that there is a chance of having a reaction? It can happen, so we want you to call out if you feel like your breathing is changing or if it's hard to swallow. If you're itchy, or if you just feel weird, tell us and we'll figure it out.' That first 15 minutes you're in the room with them, so I take the opportunity to that education."

**Practice Variation**. When nurse experts were discussing blood administration processes specific to their units, differences within practice were noted and coded into Practice Variation. Some variances were consistent between nurses and even patients due to no clear definition in the blood administration policy.

- "One of the first things I looked at was the rate thing. It bothers me because if I hang an IV as a nurse, the doctor says 100 ml per hour. However, I hang blood, the nurse makes the decision as to how fast they want to run it, except for the first 15 minutes when you run it at 100 ml per hour. Every nurse is going to make a different decision."
- "I usually run it in 100 or 125. It kind of depends on the patient."

- "The blood initially runs at a lower rate, which is arbitrary and at the nurses' discretion. I like to turn mine at 75 ml per hour. Then once that first 15 minutes is up, I just crank it up and throw it [blood] in."
- "A situation that happened to me was, there's no policy for it of course, I received a blood product and was doing my check of the product. It wasn't my patient. I was supposed to be the first check of the independent double check, and the date showed that the product was expired. So, we called the blood bank and they had us send the product back, which you're not supposed to do."

Other variances were clearly outlined in the blood administration policy, but nurses or sometimes units chose to practice differently than outlined in the policy.

- "After the transfusion is complete, we throw away the bag immediately. We used to hold the bag for X number of hours afterwards. But, blood bank or the hospital determined that it wasn't necessary."
- "I wouldn't do another physical assessment unless I thought there was a transfusion reaction. We do a full physical head to toe assessment every four hours. It's the ICU's standard of practice."
- "In terms of standing orders for the BMT (bone marrow transplant) population, there are standing orders. This is the only population that I've seen it where it'll say transfuse if hemoglobin less than or equal to seven. The nurses can place the order once every 24 hours."
- "Before releasing the order on the Kardex, I usually try to take the vital signs. You want to have vitals and listen to the patient, and I guess you're supposed to check urine within

30 minutes, but frankly I don't make the patient get up and pee. That's just not something I've ever done."

- "I think people forget about the foley [catheter] a lot. The urine, needing the urine sample and clearing that out. I would say that probably high percentage of nurses on the floor don't know that right now."

**Orientees.** During exploration of hiring and orientation for new employees, there were two clear themes once sorted into Orientees code for statements describing types of employees, nurses with experience and graduate nurses. Nurses with experience were infrequently represented in the orientation discussion. Most new employees were described as graduate nurses within the nurse residency program and often hired because of experience working on the unit as a nursing assistant before licensure.

- "We actually take a lot of new grads, and we take a smaller amount of experienced nurses. Rarely do we get an experienced nurse transitioned from another ICU. Sometimes it happens but a vast majority of our new nurses are new grad nurses."
- "I honestly think there is probably a higher percentage of just new grads. And some of the times, like me, they were techs and nursing assistants in nursing school on the unit."

**Recommendations**. Each nurse expert provided insight into the study setting and the blood administration process and offered Recommendations for improvement. Again, recommendations varied by nurse expert role in the hospital setting. The Infusion Safety Officers discussed needing improved consistency of orientation and competency among nurses and patient care units. Remaining nurse experts offered recommendations for improved access to blood administration references and increased training opportunities.

- "I have to remember how to find the Smartnote. They need to change the policy so it tells you what the Smartnote is. Even in the policy, it could be bolded."
- "I think cognitive aids are great. But I also think they are underutilized. I get the "badge buddy" but unless I look at it, I'm not going to get my step and I'm going to miss the consent, urine, or whatever. Maybe when you click on the "request blood" you get a little pop-up that says have you checked consent?, identification?, or whatever on there. Or when you scan to initiate it [blood] have you done your vitals?, emptied your urine?..."
- "If everyone on the unit had a checklist, I don't think there's a document that outlines everything that we went over down to, 'Is the pink tube good within four days'?"
- "Hands-on training would be the most helpful because my whole first year as a nurse, I didn't administer any blood products."

**Think-aloud Demonstrations**

The think-aloud blood administration demonstrations provided qualitative validity through triangulation with the interview data. The results from the think-aloud demonstrations showed nurse experts only omitted steps within the documentation phase which required an additional 'click' to access a specific page of the EMR. This implies that the nurse experts are used to working within the EMR and don't find the clicking through the various tabs to access multiple screens to be additional steps worth noting.

**Summary**

This chapter described the qualitative data results for the transcription of nurse experts' interviews and think-aloud demonstrations. The step by step discussion of blood administration procedures at the study site helped initiate a preliminary task list to be used for standard setting and assessment. These qualitative findings from the nurse experts provided rich description of

the study site and helped to answer Research Question 3) What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site?

Research Question 4) What aspects of a blood administration do graduate nurses frequently struggle to perform independently as determined by study site experts? was answered through nurse expert descriptions of frequently missed blood administration content during transfusion audits and areas of frequent policy review and concern during direct patient care. Infusion Safety Officers noted frequent absence of vital signs and physical assessment documentation prior to blood administration as an area often missed in randomized transfusion audits. The remaining nurse experts discussed concerns with recognition and management of transfusion reactions and other adverse events which may occur with blood administration.

# CHAPTER VI: STANDARD SETTING RESULTS

## Introduction

This section explains the blood administration task list development using a Delphi method to establish consensus among nurse experts during the blood administration standard setting procedure. Open text comments from the blood administration standard setting procedure were used to improve the task list and alter additional consensus building rounds.

The standard setting findings from the nurse experts provided consensus to a preliminary blood administration task list similar to a Cricothyrotomy procedure discussed in Sullivan et al. providing opinions on cognitive task analysis with the addition of consensus standard setting (2014).

In this study, the information gathered in Step 1 and further clarified by nurse experts in Steps 2 and 3 provided an introductory task list to be used in the first round of consensus building. No changes in the phases were made based on the action research approach of this study to be consistent with Steps 1 and 2 data outcomes.

## Round 1 Results

Delphi method of standard setting provided the following:

- Preparation procedural steps – Total of 12 steps, eight achieving consensus but ten needing review of wording and 3 needing approval of proposed standard.
- Pre-Transfusion Verification – Total of 11 steps, nine achieving consensus but nine needing review of wording and two needing approval of proposed standard.
- Blood Administration – Total of eight steps, seven achieving consensus but three needing review of wording and one needing approval of proposed deletion.
- Post-Transfusion – Total of seven steps, three achieving consensus but two needing review of wording and four needing approval of proposed deletion.
- Documentation – Total of eight steps, five achieving consensus but seven needing review of wording and three needing approval of proposed deletion.

- Adverse Outcomes

    - Transfusion Reactions – Total of nine steps, eight achieving consensus but five needing review of wording and one needing approval of proposed deletion.

    - TACO – Total of seven steps, three achieving consensus but four needing review of wording and four needing approval of proposed deletion.

    - TRALI – Total of three steps, one achieving consensus but one needing review of wording and two needing approval of proposed deletion.

**Round 2 Results**

Delphi method of standard setting provided the following:

- Preparation procedural steps – Total of 12 steps, all achieving consensus but one needing review of wording.

- Pre-Transfusion Verification – Total of 10 steps, one moved to blood administration phase, all achieving consensus but one needing review of wording.

- Blood Administration – Total of nine steps, all achieving consensus but four needing review of wording.

- Post-Transfusion – Total of seven steps, all achieving consensus but two needing review of wording.

- Documentation – Total of eight steps, all achieving consensus.

- Adverse Outcomes

    - Transfusion Reactions – Total of nine steps, all achieving consensus but three needing review of wording.

    - Changed to TACO and TRALI – Total of four steps, all achieving consensus but all needing review of wording.

**Round 3 Results**

Round 3 provided consensuses on standards and wording of steps to be considered the final round of standard setting. Delphi method of standard setting provided the following:

- Preparation procedural steps – Total of 12 steps, agreement after round 2.

- Pre-Transfusion Verification – Total of 10 steps, agreement after changing wording of step 8 to be less specific.
- Blood Administration – Total of nine steps, agreement after changing wording of step 4 by moving exception to comments.
- Post-Transfusion – Total of six steps, agreement after changing wording of step 2 providing exception to flush volume in the comments section and deletion of step 3 regarding keeping administration set for two hours post transfusion.
- Documentation – Total of eight steps, agreement after round 2.
- Adverse Outcomes
    - Transfusion Reactions – Total of nine steps, agreement after round 2.
    - Changed to TACO and TRALI – Total of four steps, agreement after round 2.

**Final Round**

Working toward answering RQ3. *What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site?,* the final results of the Delphi process, performed by the nurse experts, was used to collect content validity of each task when meeting consensus. The final round of the Delphi method provided validation of consensus through endorsement. The resulting blood administration task list (Table 16) provided a thorough guide of the sequence of actions, decisions to be made, equipment to consider, and comments to integrate when using the task list for assessment.

Table 16 *Blood Administration Task List*

STANDARD SETTING – **M** indicates must do; **I**, important to do; **N**, nice to do; **D**, not to do.

| | Preparation Procedural Steps | Standard Setting | | | | Comments |
|---|---|---|---|---|---|---|
| | | M | I | N | D | |
| 1 | Verify physician order for blood component. Order blood if verbal order given or standing orders apply. | X | | | | |
| 2 | Verify written consent or declination of blood transfusion has been obtained (required once each hospital stay). | X | | | | Considers patient social factors regarding transfusions (example: Jehovah's Witness). |
| 3 | Verify in order and verbalize appropriate patient indications for ordered blood component. | X | | | | |
| 4 | Review patients' transfusion history for previous transfusions or reactions. | | X | | | |
| 5 | Verify order for pre-medications or obtain order if applicable. | | X | | | |
| 6 | Verify any special administration requirements (i.e., irradiated or leukoreduction). | X | | | | |
| 7 | Perform hand hygiene. Don gloves. | X | | | | |
| 8 | Obtain type and cross sample if needed. | X | | | | |
| 9 | Uses 2 identifiers (name and MRN) to verify information on requisition, order, and patient wristband. | X | | | | |
| 10 | Label blood tube at bedside verifying patient's wristband with pre-printed label and requisition. | X | | | | |
| 11 | Obtain second validation specimen only if/when requested by blood bank. | X | | | | |
| 12 | Discuss and print education to patient regarding blood administration process and potential reactions; must provide 'Notify RN immediately if reaction symptoms occur.' | | X | | | |

| | Pre-Transfusion Verification Procedural Steps | Standard Setting | | | | Comments |
|---|---|---|---|---|---|---|
| | | M | I | N | D | |
| 1 | Perform hand hygiene. Don gloves. | X | | | | |
| 2 | Obtain set of baseline vital signs (B/P, Pulse, Respirations, Temperature, SpO2). MUST be done prior to releasing blood. | X | | | | |
| 3 | Perform a physical assessment (auscultate lung sounds and check skin conditions). MUST be done prior to releasing blood. | X | | | | |
| 4 | Review recent documentation of urine color in chart, empty foley, or ask patient to void pre-transfusion. | | X | | | |
| 5 | Verify vascular access patency. MUST be done prior to releasing blood. | X | | | | |
| 6 | Verify enough ports if multiple infusions or compatibility. MUST be done prior to releasing blood. | X | | | | |
| 7 | Administer any pre-transfusion medications per physician orders. | X | | | | |
| 8 | Obtain appropriate blood administration tubing set for the administration device. | X | | | | Considers Alaris tubing if using a rapid transfuser |
| 9 | Verify blood is ready in blood bank, release in EMR only when ready to hang blood. | X | | | | |
| 10 | Obtain blood from the tube system by entering the code to the carrier (or cooler/box if applicable). Inspect blood for appropriate color and temperature. Sign for the blood and return the tube to blood bank. | X | | | | |

Table 16 (continued)

| | Blood Administration Procedural Steps | Standard Setting | | | | Comments |
|---|---|---|---|---|---|---|
| | | M | I | N | D | |
| 1 | Perform hand hygiene. Don gloves. | X | | | | |
| 2 | Demonstrate independent double check. If any discrepancy, return blood to blood bank and do not transfuse. | X | | | | |
| 3 | Spike blood component unit and initiate infusion 1-2ml/min, or as ordered. For pediatric patients infuse at ordered rate. | X | | | | |
| 4 | Discuss which blood components can be transfused through an infusion pump. | X | | | | Considers all products except Cryoprecipate which is administered by gravity. |
| 5 | Discuss which blood components can be transfused through a warmer. | | X | | | |
| 6 | Discusses the first 25 mls of blood should be transfused in the first 15 minutes and situations when not appropriate (i.e., Neonates, risk for TACO). | X | | | | |
| 7 | Determine and set rate of administration. Discuss rationale for various rates of administration (past reactions, TACO, TRALI). | X | | | | |
| 8 | Remain with patient first 15 minutes of transfusion - assess for s/s of blood transfusion reaction. | X | | | | |
| 9 | Obtain vital signs and assessment (lung sounds, skin, urine) after the first 15 minutes then hourly until end of transfusion. | X | | | | |

| | Post-Transfusion Procedural Steps | Standard Setting | | | | Comments |
|---|---|---|---|---|---|---|
| | | M | I | N | D | |
| 1 | Perform hand hygiene. Don gloves. | X | | | | |
| 2 | Unhook from transfusion tubing, flush with 20ml saline, and saline lock or connect to scheduled IVs to the catheter site. | X | | | | Considers different flush volume if working with pediatric/neonatal population. |
| 3 | Obtain assessment (vital signs, lung sounds, skin, and urine). | X | | | | |
| 4 | Discuss changes in pre-transfusion and post-transfusion assessment. | | X | | | If given changes in assessment during simulation, able to discuss changes 'normal' vs 'adverse reaction'. |
| 5 | Place Transfusion Record Form in paper chart. | X | | | | |
| 6 | Return all unspiked blood products to the blood bank if not kept monitored in refrigerator or validated cooler. | X | | | | |

Table 16 (continued)

| Documentation Procedural Steps | | Standard Setting | | | | Comments |
|---|---|---|---|---|---|---|
| | | M | I | N | D | |
| 1 | Open or 'wrench in' EMR Blood Administration documentation field to begin documentation during pre-transfusion verification. | X | | | | |
| 2 | Demonstrate release of blood administration order on Kardex. | X | | | | |
| 3 | Verify presence of 2 signatures (independent double check nurse, initiating nurse) on Transfusion Record Form attached to bag. MUST be done prior to initiating the transfusion. | X | | | | |
| 4 | Document start time of transfusion on Transfusion Record Form attached to bag and EMR. | X | | | | |
| 5 | Open EMR documentation tab. Enter blood component unit number, product type and vital signs. | X | | | | Scans patient when EMR feature is available. |
| 6 | Chart vitals, assessment (skin condition, lung sounds, urine appearance) in EMR, at 15 minutes, with repeat assessments, and at completion. | X | | | | |
| 7 | Document time transfusion completed, sign, and place Transfusion Record Form in the lab section of the chart (verify 3 signatures: independent double check nurse, initiating nurse, transfusion completed nurse). | X | | | | |
| 8 | Chart a nursing progress note about the transfusion event. | | | X | | |

| Management of Transfusion Reactions | | Standard Setting | | | | Comments |
|---|---|---|---|---|---|---|
| | | M | I | N | D | |
| 1 | Able to verbalize signs and symptoms of suspected transfusion reaction (fever, chills, nausea, back or chest pain, tachycardia, dyspnea, hypotension, flushing/hives/rash, increase or decrease in B/P, changes in lung sounds and urine color). | X | | | | |
| 2 | Stop transfusion immediately and check that patient/blood identification is correct. | X | | | | |
| 3 | Contact or delegate contact of physician and Blood Bank with s/s of suspected reaction. | X | | | | |
| 4 | Document nurse's note using the SmartText transfusion reaction feature. | X | | | | |
| 5 | Order the lab and urine test in O2 and Fax or send the smart text note to the blood bank. | X | | | | |
| 6 | Obtain specimens (blood and urine) for the Blood Bank. | X | | | | |
| 7 | Print nurse's SmartText note and return with blood and specimens to blood bank. | X | | | | |
| 8 | Place blood product, tubing, blood, and urine specimens in biohazard bags and walk to the Blood Bank. | X | | | | |
| 9 | Monitor the patient and document VS as physician ordered or until patient is stable. | X | | | | |

| Management of TACO and TRALI | | Standard Setting | | | | Comments |
|---|---|---|---|---|---|---|
| | | M | I | N | D | |
| 1a | Utilizes transfusion slip or badge buddy and describes the signs and symptoms of TACO (precordial pain, dyspnea, crackles, cyanosis, dry cough, jugular vein distention). | X | | | | |
| 1b | Utilizes transfusion slip or badge buddy to describe the signs and symptoms of TRALI (dyspnea, pulmonary edema, normal pulmonary artery wedge pressure -if applicable). | X | | | | |
| 2 | Demonstrates where to find the rate that was ordered and verbalize indications if patient is at risk for TACO. | X | | | | |
| 3 | For patients with risk of TACO verify if volume-reduced platelets are needed. | | X | | | |
| 4 | Able to discuss the management of patients with TACO and TRALI (support blood pressure, oxygen, maintain airway). | X | | | | |

**Summary**

Through theoretical frameworks of "4C/ID" and "Ten Steps to Complex Learning" this study has sequenced and analyzed the complex procedure of blood administration. The task list has supportive information regarding each step of blood administration, including cognitive, psychomotor, and prerequisite knowledge needed for critical decision making. The task list is also organized into each phase of blood administration which could be used to design part-task in lieu of whole-task instruction.

# CHAPTER VII: DISCUSSION

The purpose of this exploratory mixed methods action research study was to provide a better understanding of the circumstances surrounding actual and perceived prelicensure preparation to practice gaps that graduate nurses have when performing blood administration procedures independently. Another goal of the study was to develop a preliminary blood administration task list to use in the continuation of the design and validation of a simulation based blood administration assessment. The research questions for the study were answered through the information obtained through graduate nurse survey responses and nurse expert interviews, demonstrations, and standard setting.

## Discussion of the Findings

**Research Question 1.** Among nurse graduates, what factors are associated with variance in perceived readiness for independent practice in blood administration procedures? This question was explored through a survey using multiple choice, choose all that apply, and open text questions. The quantitative results indicated that graduate nurses were only somewhat comfortable with blood administration in their first six months of nurse residency ($M = 3.10$, $SD = 1.20$). This outcome was consistent with nurse residency literature, listserv responses, and research site nurse residency statistics.

To explore what factors might relate with "Comfort," multiple correlations were done using independent variables of perceived "Learning Difficulty" and self-perceived "Learning Achievement" of each segmented part of blood administration with "Comfort" as the dependent variable. Positive correlations were found between "Comfort" and "Learning Difficulty" with "Starting a Transfusion," "Assessment," and "Documentation." These results could lead one to infer that the harder the participant felt the steps of starting a transfusion, assessment of the

patient, and documentation of blood administration to be, the lower the level of comfort with performing the procedure independently. On the other hand, difficulty understanding "Purpose" or "Risks" of blood administration are not factors that are consistent with lower levels of comfort. Positive correlations were found with "Comfort" and self-perceived "Learning Achievement" in "Starting Transfusion" and "Documentation." Therefore, the lower sense of self-perceived learning achievement with starting a transfusion and documenting the procedure, the lower we can expect reported comfort to be with independent blood administration. However, no correlation was found with "Comfort" and self-perceived learning achievement with understanding "Purpose," "Risks," or "Assessment" of blood administration. Qualitative responses were inconclusive due to low response rates. Multiple correlation were also done using the demographics "Type of Patient Care Unit," "Shifts Worked," and "Previous Healthcare Experience"; however, none of the correlations were significant at the .05 level. Therefore, I was unable to determine whether the type of patient care unit and shift worked or previous healthcare experience prior to licensure were factors that influenced the level of comfort with blood administration in the first six months of nurse residency.

To summarize, quantitative findings revealed that factors consistent among nurse graduates who feel unprepared for independent practice in blood administration procedures included learning difficulty with starting a transfusion, assessment, and documentation, as well as self-perceived learning achievement with starting a transfusion and documentation.

**Research Question 2.** What curriculum and/or training characteristics within prelicensure nursing programs correlate with variation in perceived lack of readiness to practice blood administration independently? To explore what curricula training characteristics might relate with "Comfort," multiple correlations were run using variables defined as "Learning

Sequence" and segmented and total "Observational Experiences" during nursing school. Positive correlations with segmented observational experiences with "Assessment" and "Completion" of blood administration with "Comfort" were found. Therefore, the more observational experiences a student can participate in during nursing school watching patient assessment and completion of blood administration, the higher we can expect reported comfort to be with independent blood administration. However, no significant correlations with "Comfort" were found in learning sequence; total observations of segmented parts "Starting" or "Documentation" of blood administration; or total summed observational experiences with blood administration. This is inconsistent with Experiential Learning Theory. Experiential learning explains how experience is translated into concepts using reflection, which in turn guides active experimentation and thus leads to new experiences. This is the underlying theory of Jeffries Simulation Theory, which is often referenced in nursing simulation research.

In summary, only total observation of assessment and completion of blood administration were consistent curricula training characteristics correlated within prelicensure nursing programs that related to readiness to practice blood administration independently.

**Research Question 3.** What essential steps are required in a blood administration assessment instrument to define proper performance, according to nurse experts at the study site? Interviews and procedural demonstrations with nurse experts were completed to explore this question. Using three rounds of a Delphi method of standard setting, a comprehensive task list was developed to provide essential steps needed in safe blood administration. (Appendix I)

**Research Question 4.** What aspects of blood administration do graduate nurses frequently struggle to perform independently as determined by study site experts? Interviews with nurse experts helped answer this question. Nurse experts voiced consistent orientation

concerns with graduate nurses' determining appropriate rate of transfusion, performance and documentation of assessment of the patient receiving a blood transfusion, and identification and management of transfusion reactions.

When comparing graduate nurse and nurse expert study results, only two common blood administration steps were found by graduate survey alone, starting a transfusion and assessment of the patient receiving a blood transfusion.

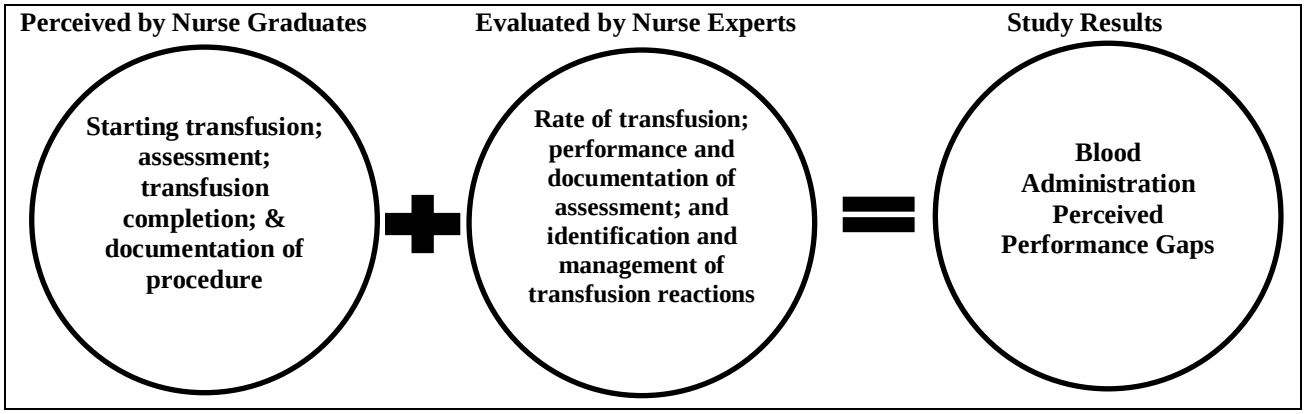


*Figure 6.* Study performance gap results

## Implications for Nursing Education

Graduate nurses are expected to fill vacancies within the nursing shortage. However, evaluations suggest low readiness for independent practice in complex procedures such as blood administration. Graduate nurses reported only a 3.1 mean average of comfort level with blood administration on a 5-point Likert scale; therefore, they need more training in the first six months to feel confident with independent practice.

**Prelicensure education**. Factors were identified which correlate with nurse graduates' lack of readiness for independent blood administration practice. Specific steps of blood administration which correlated with low comfort levels included: starting a transfusion; assessment of the patient receiving a blood transfusion; and documentation of the procedure. Prelicensure nursing program characteristics which correlate with graduate nurses' comfort with

blood administration were identified as: the number of observational experiences with assessment of the patient receiving a blood transfusion and observing the completion of the transfusion. This study's findings benefit prelicensure faculty and program administrators by providing insight into the factors and curricula characteristics related to graduate nurses' lack of comfort with specific segments of blood administration. The participants' responses identified when blood administration is taught within the curriculum is not of concern, but rather more instruction and observational experiences with starting a transfusion are needed; assessment, completion of the transfusion, and documentation of the procedure are areas graduate nurses correlate with higher comfort with independent practice.

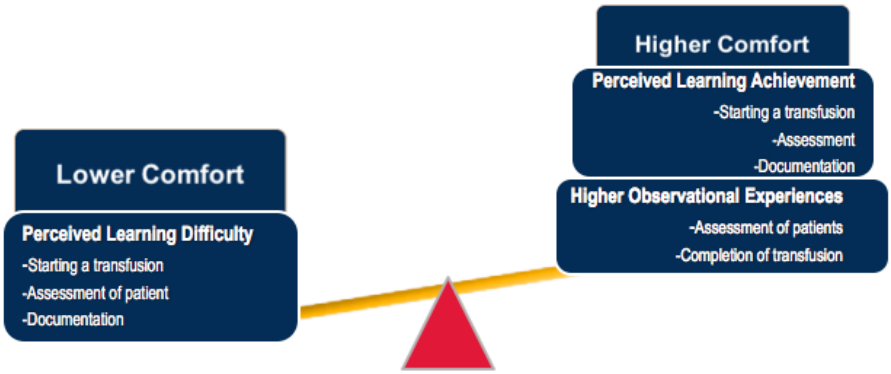


*Figure 7*. Factors which correlate with Comfort.

**Post-licensure education**. Graduate nurses and nurse experts agree more experience is needed with starting a transfusion and assessment of the patient receiving a blood transfusion to bridge the gaps graduate nurses have when performing blood administration. Additional performance gaps were determined by nurse experts to be: determining appropriate rate of transfusion, identification and management of transfusion reactions. Literature supports the use of simulation as a safe way to offer additional training for high risk procedures such as blood administration for graduate nurses during nurse residency programs.

**Nurse residency education**. Although a gap in the literature was found for assessment instruments specific to blood administration and the recognition of adverse events, this study provided a thorough development of a sequential blood administration task list to be used to evaluate performance gaps. Providing needed training saves an institution expenses incurred by turnover of nurses, poor patient care, and low reimbursement rates. By using the developed blood administration task list in a part-task instructional format, specific segmented blood administration performance gaps could be targeted in a time and resource conscious manner.

Understanding not all nurses perform blood administration in the same way, agreeing steps are essential, and following the hospital policies the task list developed in this study could be used in a generalizable way for other nurse residency and orientation programs. Also, training and keeping nurses up to date with blood administration policy changes is difficult in a large academic medical center; the task list developed in this study could be used for competency based education and annual certifications.

## Limitations of the Study

Strengths of this study include the sample size of graduate nurses, number of nursing programs represented by the graduates, amount and variety of experience represented by the nurse experts, and consensus of a thorough blood administration task list. Additional strengths include the research design and acquiring new information regarding factors correlated with the specific perceived and actual performance gaps in blood administration.

Limitations include that the study came from a single nurse residency site, limiting the exploration of potential bias of participant responses for fear of retaliation in their employment or nursing school. It is possible the graduate nurses provided higher reports of comfort and self-perceived learning achievement, as well as lower reports of difficulty. However, the surveys

were conducted online, providing no paper trail, and no identifiable information was given to the nurse residency program or the medical center. Since there was a potential 2-year time lapse between learning sequence and observational experiences of blood administration, it is also possible that recall bias could have occurred and would result in an overestimate or an underestimate of learning sequence and observational experiences because of length of time since nursing school. Additionally, lack of focus group attendance within the study was a limitation due to access. Recruitment and scheduling of focus groups could only be done via email to make participants aware of available dates and times. Graduate nurses possibly received too many emails or didn't have enough time to attend the focus groups (planned during the holiday season of mid-November to early January), leading to limited inductive analysis into types of training modalities in nursing school and clarification of areas perceived to be difficult (RQ1 & RQ2). The last limitation related to a single site approach was again recruitment access to nurse experts could only be done via email, resulting in only eight nurse experts.

Though single site design and small sample size of nurse experts and no focus group participation have been described as limitations, this study was intended to be exploratory in nature and had a 55% participation in the graduate nurse survey, and eight nurses from various units within the medical center were represented. The goals of the study were to provide a better understanding of the circumstances surrounding actual and perceived performance gaps graduate nurses have performing blood administration procedures independently, as well as to develop a blood administration task list; both goals were met.

**Recommendations for Future Research**

This exploratory mixed methods action research study identifies actual and perceived performance gaps graduate nurses have when performing blood administration independently.

The study provides the foundation for improving the focus and quantity of prelicensure educational opportunities as well as post-licensure education in organizational orientation and nurse residency programs to help graduate nurses feel more comfortable with blood administration. These finding provide the foundations to implement assessment strategies and solutions in limiting or removing performance gaps of blood administration among graduate nurses.

In the previous section, limitations were discussed regarding single site design and small sample sizes of nurse experts and lack of focus group participation. These limitations afford several recommendations for future research. Further exploration into what specific blood administration training graduate nurses want, expect, and perceive they need would lend itself to learner focused training in nurse residency programs. A multisite exploration could also test the validity of the conclusions made during analysis of this study.

With the use of interviews, demonstrations, and standard setting, a Blood Administration Task List was developed. Future research would include determining a "passing" score which discriminates between "Must Do," "Important to Do," and "Nice to Do," then applies a scoring rule in which performance of "Important" and "Nice" does not compensate for successful completion of "Must Do" steps. Simultaneously, development and administration of a simulation based scenario using the task list to assess actual performance and knowledge gaps in blood administration by graduate nurses would bridge the gap in the literature regarding specific parts of blood administration that lead graduate nurses to low comfort levels.

The findings of this study explored and found specific factors and curriculum training characteristics consistent with graduate nurses' level of comfort with blood administration. Graduate nurses are not comfortable with blood administration in their first three months of a

nurse residency program with perceived gaps in starting a transfusion; assessment of the patient receiving a blood transfusion; transfusion completion; and documentation of the procedure. Nurse experts agree graduate nurses are not prepared to perform blood administration independently because of perceived gaps in determining an appropriate rate of transfusion; performance and documentation of patient assessment; and identification and management of transfusion reactions. The study also provided a 6-Phase Blood Administration Task Model which has the potential to improve nursing education in several ways in future competency-based assessment and education.

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**Appendix A: Research Approval Letter**
**The University of Kansas Medical Center**
Human Research Protection Program APPROVAL OF SUBMISSION

July 11, 2017

Ronald Aust aust@ku.edu

Dear Ronald Aust:

On 7/11/2017, the IRB reviewed the following submission:

| | |
|---|---|
| Type of Review: | Initial Study |
| Reviewing IRB: | IRB00000161 |
| FWA#: | 00003411 |
| IRB#: | STUDY00140988 |
| Title: | The Design and Evaluation of a Blood Administration Assessment Instrument to Identify Performance Gaps in Graduate Nurses |
| Investigator: | Ronald Aust |
| Funding: | None |
| Expedited Category(ies): | (6) Voice, video, digital, or image recordings, (7)(b) Social science methods |
| Documents submitted for the above review: | • GN Survey Consent<br>• Schott_NE Recruitment Email.pdf<br>• Schott_ScientificMerit.pdf<br>• Schott_NE_Consentform_V2.pdf<br>• Nurse_Resident_Survey_II.pdf<br>• Schott_IRBNursingSupport.pdf<br>• Schott_GN Recruitment Email P3.pdf<br>• GN Focus Group Consent<br>• Schott_GN_PhaseIIISurvey.pdf<br>• Schott_GN Recruitment Email P1.pdf<br>• Schott_Expedited Project Description_Apr2017.docx<br>• Schott_KUMC Protocol_June1_V2.pdf |
| Special Determinations: | • Students / Employees |

The IRB approved the study from 7/11/2017 to 7/10/2018 inclusive.

Your approved documents are stored in the "Documents" tab for this study in the eCompliance system. The IRB stamped consent form(s) can be found under the "Final"

Mail-Stop 1032, 3901 Rainbow Blvd., Kansas City, KS 66160 Phone: (913) 588-1240 Fax: (913) 588-5771 humansubjects@kumc.edu

column on the right side of the screen. These are the **only** valid versions for documenting

informed consent.

If continuing review approval is not granted on or before 7/10/2018, approval of this study expires after that date.

Approval of this research is contingent upon your agreement to:

- **(1)** Adhere to all KUMC Policies and Procedures Relating to Human Subjects, as written in accordance with the Code of Federal Regulations (45 CFR 46).

- **(2)** Ensure that all study personnel are adequately trained for their role on the study.

- **(3)** Maintain current training in human subjects protection and current disclosure of conflicts of interest as required by KUMC policy.

- **(4)** Except where informed consent and HIPAA authorization have been formally waived by the IRB, seek, document and maintain records of informed consent and HIPAA authorization from each prospective subject or his/her legally authorized representative.

- **(5)** Maintain copies of all pertinent information related to the research study including, but not limited to, video and audio tapes, instruments, copies of written informed consent agreements, and any other supportive documents in accordance with the KUMC Research Records Retention Policy.

- **(6)** Report adverse events, non-compliance and other problems to the IRB by submitting a Report of New Information.

- **(7)** Follow the IRB-approved protocol. Submit Modifications to the IRB for any proposed changes from the previously approved project. Changes may not be initiated without prior IRB review and approval, unless a delay in implementation would place subjects at risk.

- **(8)** Submit a Continuing Review to the KUMC IRB before the expiration date. Federal regulations and IRB policies require continuing review of research at intervals appropriate to the degree of risk, but not less than once per year.

For more information on Human Subjects Research Policies or using the eCompliance system, please see our website at: http://www.kumc.edu/compliance/human-research- protection-program/institutional-review-board.html

If you have any questions regarding the human subject protection process, please do not hesitate to contact our office at 913-588-1240 or humansubjects@kumc.edu.

Sincerely, Jennifer Pennington

# Appendix B: Nurse Resident Recruitment Email and Consent

**The Design and Evaluation of a Blood Administration Assessment Instrument to Identify Performance Gaps in Graduate Nurses**

You are being asked to join a research study. You are being asked to take part in this study because you are an experienced nurse working on a unit with high blood transfusion administration rates at the University of Kansas Hospital. We are recruiting research participants to help us understand what essential steps of blood administration procedures a graduate nurse should be able to perform in order to develop an assessment instrument for the University of Kansas Hospital nurse residents. The main purpose of research is to create new knowledge for the benefit of future patients and society in general. Research studies may or may not benefit the people who participate. Research is voluntary, and you may change your mind at any time. There will be no penalty to you if you decide not to participate, or if you start the study and decide to stop early.

This research study will take place at the University of Kansas Medical Center campus with Vanessa Schott as the researcher. About 10 nurse experts will be in the study and up to 150 graduate nurses.

PURPOSE
The United States is suffering from a shortage of more than 500,000 nurses and the shortage will only intensify over the next ten years. New graduates are one of the resources expected to fill vacancies within the nursing shortage. Benner et al. determined that new nurses are underprepared for the challenges of patient care. The IOM's report, *The Future of Nursing: Leading Change, Advancing Health*, recommends the implementation of nurse residency programs to facilitate the transition of newly graduated nurses into practice. Residency programs help new graduate nurses develop the skills, competence, and confidence required for independent practice. However, during self-assessment of readiness to practice independently, graduate nurses participating in nurse residency programs routinely rank 'blood product administration/transfusion' in the top three skills/procedures they feel uncomfortable performing independently.

We are interested in understanding what essential steps of blood administration procedures a graduate nurse should be able to perform in order to develop an assessment instrument for the University of Kansas Hospital nurse residents. You will be presented with questions relevant to steps of blood administration. Steps of blood administration will then be used to design and develop a blood administration simulation-based assessment instrument to evaluate performance gaps in graduate nurses. Please be assured that your responses will be kept completely confidential.

PROCEDURES
The research study contains three phases with nurse experts participating in all three phases as content experts.
*Phase I*: Interviews are expected to last about 60-90 minutes. We will audio-record the interview so that we have correct notes about what was said. Three nurse experts will be asked to demonstrate steps of blood administration in a simulation-based environment. Follow-up interviews and Delphi process via Qualtrics© survey program will take place to investigate validity of information gathered from other resources, the sequence of actions, decisions, alternatives to consider, equipment and materials needed to perform blood administration safely and accurately.
*Phase II*: Nurse experts will be asked to help with standard setting of the assessment instrument. Meetings with the primary researcher will be conducted to determine: 1) criteria for "essential" steps, 2) apply criteria to each task in the assessment instrument to indicate which items are "essential" to complete the procedure safely and accurately, and 3) determine what percentage of essential items performed safely and accurately are required to pass. A Delphi process via Qualtrics© survey program will be distributed in the same method as during Phase I.
*Phase III*: Two nurse experts who participated in Phase I and II will be asked to learn and help rate up to 30 graduate nurses in blood administration procedures using the assessment tool.
Audio and video recordings of interviews and simulation demonstration and interview notes will be stored on a secure and password protected server until completion of dissertation defense approximately December 2018.

RISKS

There is minimal risk that you may find some of the questions during the interviews and demonstration of blood administration procedures to be embarrassing or uncomfortable. You are free not to answer any questions or participate in all phases of the study. Everyone in the study is asked to respect the confidentiality of the research; however, this cannot be guaranteed. The risk for someone outside of the research study to learn of your participation or responses is low. Your name will not be used in any publication or presentation about this research.

BENEFITS

You may not benefit directly from this study. Researchers hope that the information collected from this study may be useful in recommendations for curriculum changes in pre-licensure, nurse residency, and hospital orientation training to improve nursing practice and hopefully patient outcomes.

PAYMENT FOR PARTICIPATION

There is no payment for your participation in this study.
Please take a moment to review this study and consider participation.

Thank you,
Vanessa Schott MSN, RN

## Electronic Consent

Dear Nurse Resident,

The researchers for this study include Vanessa Schott, and her PhD committee members: Ron Aust; Young-Jin Lee; Jennifer Ng; Matthew Lineberry; and Neal Kingston. We are contacting you because you are a graduate nurse participating in the University of Kansas Hospital nurse residency program. We are recruiting research participants to help us understand your comfort level with Blood Administration as a graduate nurse.

Participation involves completing a survey that will take about 10 minutes. In addition to the survey questions, we will collect demographic information [e.g. age, gender, race, and educational status]. Your email will be will collected for registration into the study only and then will be changed into an alias for the extent of the study.

There are no personal benefits or risks to participating in this study. Participation is voluntary, and you can stop taking the survey at any time.

Participation or declining will have no impact on your employment or academic evaluations.

If you have any questions, please contact Vanessa Schott at v915s635@kumc.edu or 614-496-3371. For questions about the rights of research participants, you may contact the KUMC Institutional Review Board (IRB) at (913) 588-1240 or humansubjects@kumc.edu

Please enter your first and last name. _____

Please enter your KUMC email address. _____

Please indicate if you consent to participate in the study.

☐ I consent, begin the survey

☐ I do not consent, I do not wish to participate

# Appendix C: Nurse Resident Survey Tool

**Q1 Considering blood administration/transfusion, what is your level of comfort performing the procedure independently?**

- o Completely Uncomfortable
- o Somewhat Uncomfortable
- o Completely Comfortable
- o Somewhat Comfortable
- o Undecided

**Q2 Learning Sequence: In which part of your nursing school program did you learn about the following concepts. (Choose all that apply)**

| | YEAR 1 MONTHS 1-6 | YEAR 1 MONTHS 7-12 | YEAR 2 MONTHS 1-6 | YEAR 2 MONTHS 7-12 | I DIDN'T LEARN ABOUT BLOOD ADMINISTRATION | I DON'T REMEMBER |
|---|---|---|---|---|---|---|
| PURPOSE OF BLOOD TRANSFUSION | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| RISKS DURING BLOOD TRANSFUSIONS | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| STARTING A TRANSFUSION | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| PHYSICAL ASSESSMENT OF THE PATIENT RECEIVING BLOOD TRANSFUSION | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| DOCUMENTATION PROCEDURES OF BLOOD ADMINISTRATION | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Q3 Learning Difficulty:**
**How easy or difficult are the following concepts to learn.**

| | EXTREMELY EASY | SOMEWHAT EASY | NEITHER EASY NOR DIFFICULT | SOMEWHAT DIFFICULT | EXTREMELY DIFFICULT |
|---|---|---|---|---|---|
| PURPOSE OF BLOOD TRANSFUSION | o | o | o | o | 0 |
| RISKS DURING BLOOD TRANSFUSION | o | o | o | o | 0 |
| STARTING A TRANSFUSION | o | o | o | o | 0 |
| PHYSICAL ASSESSMENT OF THE PATIENT RECEIVING BLOOD TRANSFUSION | o | o | o | o | 0 |
| DOCUMENTATION PROCEDURES OF BLOOD TRANSFUSION | 0 | 0 | 0 | 0 | 0 |

**Q4 Please list any other concepts related to blood administration you would like to learn more about.**

_____

**Q5 Approximately how many observation exposures to blood administration did you have in your nursing school clinical experiences?**

| | First Year | Second Year | Other |
|---|---|---|---|
| **Starting a Transfusion** | | | |
| **Physical Assessment of the Patient receiving Blood Transfusion** | | | |
| **Documentation Procedures of Blood Transfusion** | | | |
| **Completing a Blood Transfusion** | | | |

**Q6 Learning Achievement:**
**To what extent did the training you received in nursing school meet your needs toward feeling competent performing the following concepts.**

| | EXTREMELY ADEQUATE | SOMEWHAT ADEQUATE | NEITHER ADEQUATE NOR INADEQUATE | SOMEWHAT INADEQUATE | EXTREMELY INADEQUATE |
|---|---|---|---|---|---|
| **PURPOSE OF BLOOD TRANSFUSION** | o | o | o | o | 0 |
| **RISKS DURING BLOOD TRANSFUSIONS** | o | o | o | o | 0 |
| **STARTING A TRANSFUSION** | o | o | o | o | 0 |
| **PHYSICAL ASSESSMENT OF THE PATIENT RECEIVING BLOOD TRANSFUSION** | o | o | o | o | 0 |
| **DOCUMENTATION PROCEDURES OF BLOOD TRANSFUSION** | o | o | o | o | o |

**Q7 What nursing program did you attend?**

_____

**D1 Have you had some form of health-related experience prior to your Nurse Residency (eg., nurses'aide/tech, EMT, etc.)?**

- o Yes
- o No

**D1.1 Please describe your previous health-related experience.**

_____

**D1.2 How much experience did you have prior to your residency?**

- o A great deal, more than 3 years
- o A lot, 1-3 years
- o A moderate amount, 6 months to 1 year
- o A little, less than 6 months
- o None at all

**D2 How long have you been in the nurse residency program?**

- o 1-3 months
- o 4-6 months
- o 7-9 months
- o 10-12 months

**D2.2 Please describe the unit you work on?**

_____

**D2.3 What shift do you normally work?**

- ☐ Days
- ☐ Nights
- ☐ Weekends only
- ☐ Other _____

**D2.4 Are you interested in participating in the focus groups part of the research?**

- o Yes
- o No

**D2.5 What is your age?**

- o Years _____
- o Prefer not to answer

**D2.6 What is your sex?**

- o Male
- o Female
- o Nonbinary Third Gender
- o Prefer to self-describe
- o Prefer not to answer

**D2.7 Choose one or more races that you consider yourself to be:**

- ☐ White or Caucasian
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian or Pacific Islander
- ☐ Spanish, Hispanic, or Latino
- ☐ Other _____

**D2.8 What is the highest level of school you have completed or the highest degree you have received?**

- o Associate degree in Nursing (2-year)
- o Bachelor's degree in Nursing (4-year)
- o Master's degree in Nursing
- o Doctoral degree in Nursing
- o Non-Nursing Bachelor's degree
- o Non-Nursing Master's degree
- o Non-Nursing Doctoral degree

# Appendix D: Nurse Expert Recruitment Email and Consent

**The Design and Evaluation of a Blood Administration Assessment Instrument to Identify Performance Gaps in Graduate Nurses**

You are being asked to join a research study. You are being asked to take part in this study because you are an experienced nurse working on a unit with high blood transfusion administration rates at the University of Kansas Hospital. We are recruiting research participants to help us understand what essential steps of blood administration procedures a graduate nurse should be able to perform in order to develop an assessment instrument for the University of Kansas Hospital nurse residents. The main purpose of research is to create new knowledge for the benefit of future patients and society in general. Research studies may or may not benefit the people who participate. Research is voluntary, and you may change your mind at any time. There will be no penalty to you if you decide not to participate, or if you start the study and decide to stop early.

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RISKS
There is minimal risk that you may find some of the questions during the interviews and demonstration of blood administration procedures to be embarrassing or uncomfortable. You are free not to answer any questions or participate in all phases of the study. Everyone in the study is asked to respect the confidentiality of the research; however, this cannot be guaranteed. The risk for someone outside of the research study to learn of your participation or responses is low. Your name will not be used in any publication or presentation about this research.

BENEFITS
You may not benefit directly from this study. Researchers hope that the information collected from this study may be useful in recommendations for curriculum changes in pre-licensure, nurse residency, and hospital orientation training to improve nursing practice and hopefully patient outcomes.

PAYMENT FOR PARTICIPATION
There is no payment for your participation in this study.
Please take a moment to review this study and consider participation.

QUESTIONS
If you have any questions, please contact Vanessa Schott at v915s635@kumc.edu or 614-496-3371. For questions about the rights of research participants, you may contact the KUMC Institutional Review Board (IRB) at (913) 588-1240 or humansubjects@kumc.edu

Please enter your first and last name. _____

Please enter your KUMC email address. _____

Please indicate if you consent to participate in the study.

☐ I consent, begin the survey

☐ I do not consent, I do not wish to participate

Thank you,
Vanessa Schott MSN, RN

## Appendix E: Nurse Expert Interview Protocol

First, I want to thank you for consenting to participate in my study 'The Design and Evaluation of a Blood Administration Assessment to Identify Performance Gaps in Graduate Nurses'. I want to remind you that your participation is voluntary. You can choose to answer any of the questions - choose not to answer any of the questions.
For the purposes of transcribing your responses, you will be called interviewee number ___. Is that alright with you? I will keep your identity anonymous; and all data will be maintained in a secure research file within KUMC for the length of the study.

Introduction: You have been recruited for this study because you have been deemed an expert in blood administration from the (nurse educator, nurse manager, transfusion specialist) on your unit.

1 Please tell me about yourself (i.e., nursing career, unit experiences)
2 Can you tell me about your nursing unit; for example, type of patients, average number of patients/nurse, frequent skills and procedures?

3 Can you tell me about experience level of newly hired nurses on your unit?
4 Tell me about their orientation to the unit specific to length of time, style, evaluation of readiness to work independently.

As a veteran nurse and nursing faculty, I am curious about new graduates' readiness for practice in their first nursing position. In TUKHS nurse residency program participants are asked to Likert Scale rate various procedures they may commonly do. For example, urinary catheter insertion, medication delivery, and emergency management. Common skills nurse residents rate they are 'uncomfortable performing independently' are Code/Emergency Response and Blood Product Administration/Transfusion. The hospital has chosen Code/Emergency Response as an organizational priority. Therefore, my study is focused on their 'actual and perceived performance gaps' with blood administration.

Blood Administration: This study is specific to blood administration…
5 Can you tell me about the average amount and type of blood products administered on your unit?
6 Can you tell me about the orientation process/training for blood administration? (i.e., resources, cognitive aids, documentation, assessment of competency)

Talk Through Procedure: Because you are an expert in blood administration, I am interested in what steps are required on your unit for blood administration.

7 Can you talk through the blood process?
   a. Preparation
   b. Pre-Transfusion checks
   c. Administration
   d. Post-Transfusion
   e. Documentation
   f. Transfusion Reactions

As a nurse who is asked to train/precept new nurses; I'm curious in your opinion what aspects of blood administration graduate nurses struggle with.

8 In your opinion, what do the orientees find easiest and most difficult to do/remember?
   a. Can you give me some examples of why you think they are easy/difficult?

**Transfusion Nurse Expert Interview Variances**

Introduction: You have been recruited for this study because you have been deemed an expert in blood administration based on your role as transfusion specialist.

2. Can you tell me about your duties as a transfusion specialist?

Blood Administration: This study is specific to blood administration…

1. Can you tell me about the average amount and type of blood products administered at TUKHS?

2. Can you tell me about the auditing process?
    a. How do you decide who to audit?
    b. Do you attempt to get various skill levels in the auditing process; if so how?
    c. How do you evaluate competence?

3. What can you tell me about the current training for blood administration? (i.e., resources, cognitive aids, documentation, assessment of competency)

4. Can you tell me about how updated policies/procedures are distributed to nurses?
    a. How do you evaluate if nurses have read the updates?

That is all the questions I have for today.

Next steps:

As experts, procedural knowledge often becomes automated causing unintentional omission of important decision making steps. Since the goal of the study is to design a blood administration assessment, I will be asking two nurse experts to come to the simulation department to perform the blood administration procedure in a videotaped think-aloud method to capture any unintentional omission. Would you be willing to participate in one of those think-aloud sessions?

After all the nurse expert interviews and think-alouds have been completed, transcribed, and coded you will receive a survey link to identify procedure steps as 'Knowledge, Behavior/Skill, and or Critical Decision Making'. I will then combine all nurse expert responses to build consensus. This will hopefully only take two or three rounds of surveys to reach. They will be done without needing to meet in person; with the intent to be completed within a week of receipt.

Do you have any questions for me?

# Appendix F: Nurse Expert Delphi Process Survey (Round 1)

**Goal of Standard Setting Exercise** Since blood administration is rarely observed as a pre-licensure nursing student, a thorough needs assessment will help determine areas for recommended educational experiences and future simulation training. We therefore need to break down each step of the blood administration process to determine exactly what knowledge and observable behaviors are required for each step to be counted 'correct' in a standardized simulation based assessment for all nurse residents who administer blood products. The goal is to propose consistent practices in blood administration across the various units of the hospital system and develop time and cost effective educational opportunities. Therefore, we need each of you as expert clinicians to participate in this 'Standard Setting Exercise.'

**Steps for Standard Setting Exercise:** Review each item under the various "phases" of Blood Administration. For each procedural step item, ask yourself the following:

1. What **TYPE** of procedural step is it? **Basic Knowledge, Psychomotor Skill, Critical Decision Making**
   The thought would be if a nurse resident omits or performs this particular step incorrectly during simulation based assessment, is it probable that he or she would benefit from classroom theory based education (Basic Knowledge); skills lab with simple task trainers (Psychomotor Skills); complex evolving case studies (High-fidelity Simulation-Based Training) before performing the procedure independently on a real patient?
2. Is this item needed (**Standard Setting**) for safe blood administration? **Must Do, Important to Do, Nice to Do, Not to Do**
   The thought would be if a nurse resident omits or performs this particular step incorrectly during simulation based assessment would result in 'Needs More Training' (Must Do); if a nurse resident misses more than 1-2 of these, 'Needs More Training' (Important to Do); or these items are considered 'helpful tips and tricks' and could be included in instructional materials because they are not considered essential for safe patient care (Nice to Do); or this is not part of TUKHS policy (Not to Do)?
3. What needs to be changed? **Comments** If items are unclear, recommend reordering, you would like to add items, or reword items make comments in the free text areas after each step.

Please complete this survey within the next 5-7 days to expedite compilation of responses. Items which have 100% agreement across the group will be cataloged appropriately. Items that don't meet consensus will be redistributed to the group for feedback and re-survey processing.

Preparation procedural steps:

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Verify physician order for blood component. Order blood if standing orders apply. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Verify and verbalize appropriate patient indications for ordered blood component. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain patients' transfusion history of previous transfusions or reactions. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Verify any special administration requirements (i.e., irradiated or leukoreduction). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Perform hand hygiene. Don gloves. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain type and cross sample. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Uses 2 identifiers to verify information on requisition/order and patient wristband. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Label specimen at bedside verifying patient's wristband with pre-printed label. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain second validation specimen if requested by blood bank. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Determine and provide education to patient regarding process and reactions. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Preparation phase that are not included above?

Pre-Transfusion Verification procedural steps:

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skills | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Verify written consent for blood transfusion has been obtained (required once each hospital stay). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Perform hand hygiene. Don gloves. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain set of baseline vital signs (B/P, Pulse, Respirations, Temperature, SpO2). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Perform a physical assessment (auscultate lung sounds and check skin conditions). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Empty foley or ask patient to void pre-transfusion. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Verify vascular access patency. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Verify enough ports if multiple infusions or compatibility. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Administer any pre-transfusion medications per physician orders. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Discuss which blood components should be transfused through an infusion pump (all with the exception of cryoprecipitate and in the event of an emergency). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain appropriate administration set for component to be infused. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Prepare 0.9 sodium chloride flush line and pump. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Notify blood bank only when ready to hang blood. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain blood from the tube system by entering the code to the carrier. Inspect blood for appropriate color and temperature. Sign for the blood and return the tube to blood bank. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Initiates infusion within 30 minutes of receiving blood from blood bank. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Discuss independent double checks must be performed on every patient receiving blood to ensure accurate patient identification according to the blood administration policy. If any discrepancy, return blood to blood bank and do not transfuse. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Pre-Transfusion Verification phase that are not included above?

Blood Administration procedural steps:

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Perform hand hygiene. Don gloves. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Verify patient identification information and blood product accuracy at bedside. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Spike blood component unit and initiate infusion 1-2ml/min, or as ordered. For pediatric patients infuse at ordered rate. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Discusses the first 25 mls of blood should be transfused in the first 15 minutes. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Determine and set rate of administration. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Remain with patient first 15 minutes of transfusion - assess for s/s of blood transfusion reaction. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain vitals signs and assessment (lung sounds, skin, urine) after the first 15 minutes then hourly until end of transfusion. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Returns any blood not transfused within 4 hours to Blood Bank (four hours is the maximum hang time for a unit of blood). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Blood Administration phase that are not included above?

Post-Transfusion procedural steps:

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Perform hand hygiene. Don gloves. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Clear line with 0.9% NS after blood has completely infused. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Unhook from transfusion tubing and saline lock the catheter site. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Keep donor unit and administration set available for two hours post transfusion. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Obtain assessment (vital signs, lung sounds, skin, and urine). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Place Transfusion Record Form in paper chart. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Return all unspiked blood products to the blood bank if not kept monitored in refrigerator or validated cooler. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Post-Transfusion phase that are not included above?

Documentation procedural steps:

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Verify presence of 2 signatures (independent double check nurse, initiating nurse) on Transfusion Record Form attached to bag. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Document start time of transfusion on Transfusion Record Form attached to bag. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Document time transfusion completed, sign, and place Transfusion Record Form in the lab section of the chart (verify 3 signatures: independent double check nurse, initiating nurse, transfusion completed nurse) . | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Add or open EMR Blood Administration documentation. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Scan patient to open EMR documentation tab. Enter blood component unit number. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Chart vitals, assessment (skin condition, lung sounds, urine appearance) in EMR. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Documentation phase that are not included above?

Management of Transfusion Reactions:

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Able to verbalize signs and symptoms of suspected transfusion reaction (fever, chills, nausea, back or chest pain, tachycardia, dyspnea, hypotension, flushing/hives/rash, increase or decrease in B/P). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Stop transfusion immediately and check that patient/blood identification is correct. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Contact physician and Blood Bank with s/s of suspected reaction. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Document a nurses note using the SmartText feature ( .reaction ). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Complete an Investigation of Suspected Transfusion Reaction Form. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Send specimens (blood and urine) to the Blood Bank. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Send remaining blood product and tubing back to Blood Bank. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Monitor the patient and document VS every 15 minutes or until patient is stable. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Management of Transfusion Reactions section that are not included above?

Management of Patient with Transfusion Associated Circulatory Overload (TACO):

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Able to verbalize indications resulting in patients at risk for TACO. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Able to describe the signs and symptoms of TACO (precordial pain, dyspnea, crackles, cyanosis, dry cough, jugular vein distention). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| For patients with a risk of TACO the infusion runs no faster than 85 mls/hr. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| For patients with risk of TACO verify volume-reduced platelets. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Stop the transfusion immediately if TACO is suspected. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Notify the physician and Blood Bank with s/s of suspected TACO. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Management of TACO section that are not included above?

Management of Patient with Transfusion Related Acute Lung Injury (TRALI):

| | Step Type | | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|---|---|
| | Basic Knowledge | Psychomotor Skill | Critical Decision Making | Must Do | Important to Do | Nice to Do | Not to Do | Comments |
| Able to explain the mechanism of TRALI. | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Able to describe the signs and symptoms of TRALI (dyspnea, pulmonary edema, normal pulmonary artery wedge pressure). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |
| Able to discuss the management of patients with TRALI (support blood pressure, oxygen, maintain airway). | ☐ | ☐ | ☐ | ○ | ○ | ○ | ○ | |

What other steps are important in the Management of TRALI section that are not included above?

# Appendix G: Nurse Expert Delphi Process Survey (Round 2)

Abbreviations: **X consensus met**; X consensus not met. RED text indicates recommended changes.
STANDARD SETTING – **M indicates must do; I, important to do; N, nice to do; D, not to do.**

| Preparation Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Verify physician order for blood component. Order blood if verbal order given or standing orders apply. | **X** | | | | |
| 2 | Verify written consent for blood transfusion has been obtained (required once each hospital stay). Considers patient social factors regarding transfusions (example: Jehovah's Witness). | **X** | | | | |
| 3 | Verify in order and verbalize appropriate patient indications for ordered blood component. | **X (Proposed)** | X | | | • RN should know what the product should be platelets, red cells, cryoprecipitate or plasma.<br>• I believe the indication for the product is required in the ordering process/visible on the order |
| 4 | Review patients' transfusion history for previous transfusions or reactions. | X | **X (Proposed)** | | | • Sometimes this is more detrimental if the patient does not know exactly what the reaction was and could delay the transfusion. Not so important.<br>• I do not know of a streamlined way to assess for previous reactions outside asking the patient and doing a detailed chart review. |
| 5 | Verify order for pre-medications or obtain order if applicable. | | **X (Proposed)** | | | **NEW** |
| 6 | Verify any special administration requirements (i.e., irradiated or leukoreduction). | **X** | | | | |
| 7 | Perform hand hygiene. Don gloves. | **X** | | | | |
| 8 | Obtain type and cross sample if needed. | **X** | | | | |
| 9 | Uses 2 identifiers (name and MRN) to verify information on requisition, order, and patient wristband. | **X** | | | | |
| 10 | Label blood tube at bedside verifying patient's wristband with pre-printed label and requisition. | **X** | | | | |
| 11 | Obtain second validation specimen only if/when requested by blood bank. | **X** | | | | |
| 12 | Discuss and print education to patient regarding blood administration process and potential reactions; must provide 'Notify RN immediately if reaction symptoms occur.' | X | **X (Proposed)** | | | • An education form should be created that patients can keep with them describing the signs and symptoms of a transfusion reaction<br>• All nurses should have a basic knowledge of s/s to explain to the pt, but it takes critical thinking to know how medication the pt. is taking may alter their s/s, i.e., antipyrectics, beta blockers etc...<br>• Including to notify the RN immediately if any of the reaction symptoms occur |

| Pre-Transfusion Verification Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Perform hand hygiene. Don gloves. | **X** | | | | • basic, but glad to see this included in each part of the process |
| 2 | Obtain set of baseline vital signs (B/P, Pulse, Respirations, Temperature, SpO2). MUST be done prior to releasing blood. | **X** | | | | |
| 3 | Perform a physical assessment (auscultate lung sounds and check skin conditions). MUST be done prior to releasing blood. | **X** | | | | |
| 4 | Review recent documentation of urine color in chart, empty foley, or ask patient to void pre-transfusion. | X | **X (Proposed)** | X | | • Not always able to do<br>• I marked important as probably can note the urine color in the bag, and may not be feasable to ask pt. to void prior to transfusion. There maybe already a Nsg assessment of urine prior to the transfusion so it may not be reasonable to ask the pt. to void again.<br>• Less important in the ICU with hourly intake and output monitoring |
| 5 | Verify vascular access patency. MUST be done prior to releasing blood. | **X** | | | | |
| 6 | Verify enough ports if multiple infusions or compatibility. MUST be done prior to releasing blood. | **X** | | | | |
| 7 | Administer any pre-transfusion medications per physician orders. | **X** | | | | • Premedication can be given after the blood has been started if missed. Not critical to know.<br>• Sometimes these pre-medication orders are not listed on PRN medications and the RN must obtain orders |
| 8 | Demonstrate which blood components can be transfused through an infusion pump and use of a warmer. | **X (Proposed)** | X | | | • There is also literature that says that platelets should not be ran through a warmer, same is true for Cryo. Need to follow OEM advice...<br>• I think this is more of an observation of a psychomotor skill than a discussion point |
| 9 | Obtain filter administration set for component to be infused, unless using rapid infuser. | **X** | | | | |
| 10 | Verify blood is ready in blood bank, release in EMR only when ready to hang blood. | **X** | | | | • This is just to ask for delivery of the product after vital signs, assessment etc. is complete.<br>• Ensure product is ready before releasing product in the electronic health record |
| 11 | Obtain blood from the tube system by entering the code to the carrier (or cooler/box if applicable). Inspect blood for appropriate color and temperature. Sign for the blood and return the tube to blood bank. | **X** | | | | • Note: Some blood is sent via cooler/box depending upon the location. The part that really requires critical thinking is the inspection part. I don't really think that nursing really do this step routinely and I know they have never really been exposed to a visual guide that can show all the different types of ways products can look. Go to :https://professionaleducation.blood.ca/sites/msi/files/VAG_en.pdf<br>• This may or may not be done by the primary RN, any RN on the unit could complete this step |

| Blood Administration Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Perform hand hygiene. Don gloves. | X | | | | |
| 2 | Demonstrate independent double check. If any discrepancy, return blood to blood bank and do not transfuse. | X | | | | MOVED FROM PRE-TRANSFUSION PHASE |
| 3 | Spike blood component unit and initiate infusion 1-2ml/min, or as ordered. For pediatric patients infuse at ordered rate. | X | | | | |
| 4 | Discusses the first 25 mls of blood should be transfused in the first 15 minutes and situations when not appropriate (i.e., risk for TACO). | X | | | | • May not be 25 mL in 15 minutes if the ordered rate is slower (ie high risk adult orders are for 80 mL/hour) |
| 5 | Determine and set rate of administration. Discuss rationale for various rates of administration (past reactions, TACO, TRALI). | X | | | | • Consider past transfusion history when selecting administration rate if the rate is not ordered |
| 6 | Remain with patient first 15 minutes of transfusion - assess for s/s of blood transfusion reaction. | X | | | | |
| 7 | Obtain vital signs and assessment (lung sounds, skin, urine) after the first 15 minutes then hourly until end of transfusion. | X | | | | • Critical thinking to compare previous assessment/vital signs for potential s/s of transfusion reaction |
| 8 | Returns any blood not transfused within 4 hours to Blood Bank (four hours is the maximum hang time for a unit of blood). | X | X | X | X (Proposed) Deletion | • No need since blood would have to be wasted.<br>• I have never had non-transfused blood to return unless there was a suspected transfusion reaction |

| Post-Transfusion Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Perform hand hygiene. Don gloves. | **X** | | | | |
| 2 | Unhook from transfusion tubing and saline lock or connect to scheduled IVs to the catheter site. | **X (Proposed)** | X | | | • I don't believe there's a policy regarding flushing after transfusion. We just saline lock or flush and restart the previous infusion.<br>• Currently not practices as we have new blood tubing without a second spike for saline and due to the saline shortage from the hurricane |
| 3 | Keep donor unit and administration set available for two hours post transfusion. | X | **X (Proposed)** | | X | • Old thinking.<br>• No longer needed. We dispose of the blood bag and tubing as soon as the transfusion is complete.<br>• This is always interesting to me as it is known that a transfusion reaction can occur several hours later so if the set/bag are only at the bedside for 2 hours and a reaction is noted after that time how is this helpful |
| 4 | Obtain assessment (vital signs, lung sounds, skin, and urine). | **X** | | | | • Critical thinking to compare assessment findings to potential reaction signs/symptoms |
| 5 | Discuss changes in pre-transfusion and post-transfusion assessment. | | **X (Proposed)** | | | **NEW** |
| 6 | Place Transfusion Record Form in paper chart. | **X** | | | | |
| 7 | Return all unspiked blood products to the blood bank if not kept monitored in refrigerator or validated cooler. | X | **X (Proposed)** | | X | • For tracking and traceability purposes<br>• I suppose the blood has to go somewhere, but Blood Bank typically says they don't want blood returned to them; once it's on the floor, it stays there.<br>• Except if transfusion reaction or massive transfusion protocol I have not had unused product |

| Documentation Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Demonstrate release of blood administration order on Kardex. | **X (Proposed)** | | | | **NEW** |
| 2 | Verify presence of 2 signatures (independent double check nurse, initiating nurse) on Transfusion Record Form attached to bag. MUST be done prior to initiating the transfusion. | **X** | | | | • This should be done prior to initiating the transfusion |
| 3 | Document start time of transfusion on Transfusion Record Form attached to bag and EMR. | **X** | | | | |
| 4 | Document time transfusion completed, sign, and place Transfusion Record Form in the lab section of the chart (verify 3 signatures: independent double check nurse, initiating nurse, transfusion completed nurse). | **X** | | | | |
| 5 | Add or open EMR Blood Administration documentation prior to or during initiating. | **X** | | | | • The EMR documentation should be initiated and done prior to initiating the transfusion, at the 15 minute check, and at the completion-not all retrospectively |
| 6 | Scan patient to open EMR documentation tab. Enter blood component unit number, product type and vital signs. | **X** | | | | |
| 7 | Chart vitals, assessment (skin condition, lung sounds, urine appearance) in EMR, at 15 minutes, with repeat assessments, and at completion. | **X (Proposed)** | X | | | • Vitals documentation occur with the above step when entering the blood unit details, skin/lungs/urine occur separately in the flowsheet<br>• Vitals and lung/skin/urine assessment should be documented which each assessment. |
| 8 | Chart a nursing progress note about the transfusion event. | | **X (Proposed)** | | | **NEW**<br>• Documentation of the completion of the transfusion, volume infused, suspected reaction, and post infusion vitals/assessment is not noted in the steps. Also, part of the infusing/post-infusion process should include verbalizing the s/s of a reaction and how or where to find the policy to intervene in case of a suspected reaction. |

| Management of Transfusion Reactions | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Able to verbalize signs and symptoms of suspected transfusion reaction (fever, chills, nausea, back or chest pain, tachycardia, dyspnea, hypotension, flushing/hives/rash, increase or decrease in B/P, changes in lung sounds and urine color). | X | | | | |
| 2 | Stop transfusion immediately and check that patient/blood identification is correct. | X | | | | |
| 3 | Contact or delegate contact of physician and Blood Bank with s/s of suspected reaction. | X | | | | |
| 4 | Access EMR and place orders from the suspected transfusion order set. | X (Proposed) | | | | NEW |
| 5 | Obtain specimens (blood and urine) for the Blood Bank. | X | | | | |
| 6 | Complete an Investigation of Suspected Transfusion Reaction Form. | X | | | | • I'm not familiar with this form. We complete the smart text note.<br>• This I would complete prior to documenting in the EHR as it gets sent to blood bank |
| 7 | Document nurse's note using the SmartText feature, print and return with blood to blood bank. | X | | | | |
| 8 | Walk remaining blood product, tubing, blood, and urine specimens to Blood Bank. | X | | | | |
| 9 | Monitor the patient and document VS every 15 minutes or until patient is stable. | X | | | | |

| Management of TACO | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Demonstrates where to find and verbalize indications resulting in patients at risk for TACO. | **X (Proposed)** | X | | | • Just need to know that something untoward has happened once the blood has started.<br>• Listed when ordering blood products. |
| 2 | Utilizes badge buddy and describes the signs and symptoms of TACO (precordial pain, dyspnea, crackles, cyanosis, dry cough, jugular vein distention). | **X (Proposed)** | X | | | • General reaction symptoms are more important than differentiating between TACO and TRALI. |
| 3 | Discuss patients with a risk of TACO the infusion runs no faster than 85 mls/hr. | **X** | | | | • "Ify" if the pt. is bleeding out and need more rapid infusion. |
| 4 | For patients with risk of TACO verify volume-reduced platelets. | X | **X (Proposed)** | | X | • TACO is related to Red Cells usually but can be any product. Slow the rate is the answer to preventing TACO.<br>• I'm not familiar with this practice<br>• I did not know this was an option |
| 5 | Stop the transfusion immediately if TACO is suspected. | **X** | | | | |
| 6 | Notify the physician and Blood Bank with s/s of suspected TACO. | **X** | | | | |
| 7 | Follow suspected transfusion reaction protocol (orders, specimens, paperwork). | **X (Proposed)** | | | | **NEW** |

| Management of TRALI | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Able to explain the mechanism of TRALI. | X | **X (Proposed)** | X | | • Just need to know that something that you were not expected has happened to the patient once the blood was started.<br>• Understanding the mechanism is less important than identifying the s/s of a reaction. |
| 2 | Use badge buddy to describe the signs and symptoms of TRALI (dyspnea, pulmonary edema, normal pulmonary artery wedge pressure-if applicable). | **X (Proposed)** | X | | | • In general, just knowing to support the symptoms is the most important. |
| 3 | Able to discuss the management of patients with TRALI (support blood pressure, oxygen, maintain airway). | **X** | | | | |

# Appendix H: Nurse Expert Delphi Process Survey (Round 3)

STANDARD SETTING – **M indicates must do; I, important to do; N, nice to do; D, not to do.**

| Preparation Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Verify physician order for blood component. Order blood if verbal order given or standing orders apply. | X | | | | |
| 2 | Verify written consent or declination of blood transfusion has been obtained (required once each hospital stay). | X | | | | Considers patient social factors regarding transfusions (example: Jehovah's Witness). |
| 3 | Verify in order and verbalize appropriate patient indications for ordered blood component. | X | | | | |
| 4 | Review patients' transfusion history for previous transfusions or reactions. | | X | | | |
| 5 | Verify order for pre-medications or obtain order if applicable. | | X | | | |
| 6 | Verify any special administration requirements (i.e., irradiated or leukoreduction). | X | | | | |
| 7 | Perform hand hygiene. Don gloves. | X | | | | |
| 8 | Obtain type and cross sample if needed. | X | | | | |
| 9 | Uses 2 identifiers (name and MRN) to verify information on requisition, order, and patient wristband. | X | | | | |
| 10 | Label blood tube at bedside verifying patient's wristband with pre-printed label and requisition. | X | | | | |
| 11 | Obtain second validation specimen only if/when requested by blood bank. | X | | | | |
| 12 | Discuss and print education to patient regarding blood administration process and potential reactions; must provide 'Notify RN immediately if reaction symptoms occur.' | | X | | | |

| Pre-Transfusion Verification Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Perform hand hygiene. Don gloves. | X | | | | |
| 2 | Obtain set of baseline vital signs (B/P, Pulse, Respirations, Temperature, SpO2). MUST be done prior to releasing blood. | X | | | | |
| 3 | Perform a physical assessment (auscultate lung sounds and check skin conditions). MUST be done prior to releasing blood. | X | | | | |
| 4 | Review recent documentation of urine color in chart, empty foley, or ask patient to void pre-transfusion. | | X | | | |
| 5 | Verify vascular access patency. MUST be done prior to releasing blood. | X | | | | |
| 6 | Verify enough ports if multiple infusions or compatibility. MUST be done prior to releasing blood. | X | | | | |
| 7 | Administer any pre-transfusion medications per physician orders. | X | | | | |
| 8 | Obtain blood administration tubing set for the Alaris pump for all products. | X | | | | NEW |
| 9 | Verify blood is ready in blood bank, release in EMR only when ready to hang blood. | X | | | | |
| 10 | Obtain blood from the tube system by entering the code to the carrier (or cooler/box if applicable). Inspect blood for appropriate color and temperature. Sign for the blood and return the tube to blood bank. | X | | | | |

| Blood Administration Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Perform hand hygiene. Don gloves. | X | | | | |
| 2 | Demonstrate independent double check. If any discrepancy, return blood to blood bank and do not transfuse. | X | | | | |
| 3 | Spike blood component unit and initiate infusion 1-2ml/min, or as ordered. For pediatric patients infuse at ordered rate. | X | | | | |
| 4 | Discuss which blood components can be transfused through an infusion pump. Discuss all products except Cryoprecipate which is administered by gravity. | X | | | | |
| 5 | Discuss which blood components can be transfused through a warmer. | | X | | | |
| 6 | Discusses the first 25 mls of blood should be transfused in the first 15 minutes and situations when not appropriate (i.e., Neonates, risk for TACO). | X | | | | |
| 7 | Determine and set rate of administration. Discuss rationale for various rates of administration (past reactions, TACO, TRALI). | X | | | | |
| 8 | Remain with patient first 15 minutes of transfusion - assess for s/s of blood transfusion reaction. | X | | | | |
| 9 | Obtain vital signs and assessment (lung sounds, skin, urine) after the first 15 minutes then hourly until end of transfusion. | X | | | | |

| Post-Transfusion Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Perform hand hygiene. Don gloves. | X | | | | |
| 2 | Unhook from transfusion tubing, flush with 20ml saline, and saline lock or connect to scheduled IVs to the catheter site. | X | | | | |
| 3 | Keep donor unit and administration set available for two hours post transfusion. | | X | | | |
| 4 | Obtain assessment (vital signs, lung sounds, skin, and urine). | X | | | | |
| 5 | Discuss changes in pre-transfusion and post-transfusion assessment. | | X | | | • If given changes in assessment during simulation, able to discuss changes 'normal' vs 'adverse reaction'. |
| 6 | Place Transfusion Record Form in paper chart. | X | | | | |
| 7 | Return all unspiked blood products to the blood bank if not kept monitored in refrigerator or validated cooler. | X | | | | |

| Documentation Procedural Steps | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Open or 'wrench in' EMR Blood Administration documentation field to begin documentation during pre-transfusion verification. | X | | | | |
| 2 | Demonstrate release of blood administration order on Kardex. | X | | | | |
| 3 | Verify presence of 2 signatures (independent double check nurse, initiating nurse) on Transfusion Record Form attached to bag. MUST be done prior to initiating the transfusion. | X | | | | |
| 4 | Document start time of transfusion on Transfusion Record Form attached to bag and EMR. | X | | | | |
| 5 | Open EMR documentation tab. Enter blood component unit number, product type and vital signs. | X | | | | • Scan patient when feature is available |
| 6 | Chart vitals, assessment (skin condition, lung sounds, urine appearance) in EMR, at 15 minutes, with repeat assessments, and at completion. | X | | | | |
| 7 | Document time transfusion completed, sign, and place Transfusion Record Form in the lab section of the chart (verify 3 signatures: independent double check nurse, initiating nurse, transfusion completed nurse). | X | | | | |
| 8 | Chart a nursing progress note about the transfusion event. | | | X | | |

| Management of Transfusion Reactions | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1 | Able to verbalize signs and symptoms of suspected transfusion reaction (fever, chills, nausea, back or chest pain, tachycardia, dyspnea, hypotension, flushing/hives/rash, increase or decrease in B/P, changes in lung sounds and urine color). | X | | | | |
| 2 | Stop transfusion immediately and check that patient/blood identification is correct. | X | | | | |
| 3 | Contact or delegate contact of physician and Blood Bank with s/s of suspected reaction. | X | | | | |
| 4 | Document nurse's note using the SmartText transfusion reaction feature. | X | | | | |
| 5 | Order the lab and urine test in O2 and Fax or send the smart text note to the blood bank. | X | | | | |
| 6 | Obtain specimens (blood and urine) for the Blood Bank. | X | | | | |
| 7 | Print nurse's SmartText note and return with blood and specimens to blood bank. | X | | | | |
| 8 | Place blood product, tubing, blood, and urine specimens in biohazard bags and walk to the Blood Bank. | X | | | | |
| 9 | Monitor the patient and document VS as physician ordered or until patient is stable. | X | | | | |

| Management of TACO and TRALI | | Standard Setting | | | | Edits or Recommendations |
|---|---|---|---|---|---|---|
| | | M | I | N | D | Comments |
| 1a | Utilizes transfusion slip or badge buddy and describes the signs and symptoms of TACO (precordial pain, dyspnea, crackles, cyanosis, dry cough, jugular vein distention). | X | | | | |
| 1b | Utilizes transfusion slip or badge buddy to describe the signs and symptoms of TRALI (dyspnea, pulmonary edema, normal pulmonary artery wedge pressure -if applicable). | X | | | | |
| 2 | Demonstrates where to find the rate that was ordered and verbalize indications if patient is at risk for TACO. | X | | | | |
| 3 | For patients with risk of TACO verify if volume-reduced platelets are needed. | | X | | | |
| 4 | Able to discuss the management of patients with TACO and TRALI (support blood pressure, oxygen, maintain airway). | X | | | | |